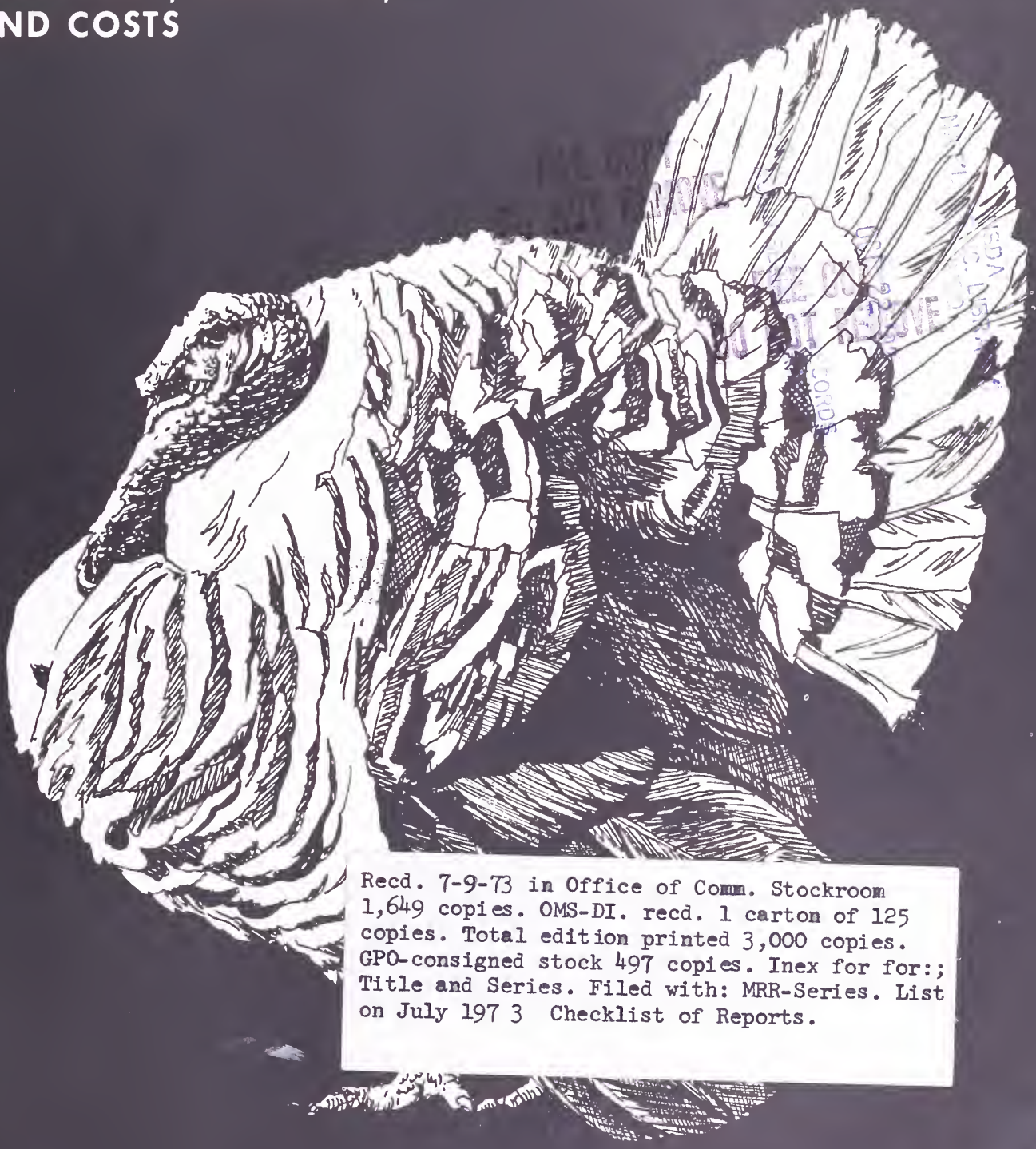
1
984mr
c4

1000

TURKEY INDUSTRY:
STRUCTURE, PRACTICES, AND COSTS



Recd. 7-9-73 in Office of Comm. Stockroom 1,649 copies. OMS-DI. recd. 1 carton of 125 copies. Total edition printed 3,000 copies. GPO-consigned stock 497 copies. Inex for for:; Title and Series. Filed with: MRR-Series. List on July 197 3 Checklist of Reports.

U.S. DEPARTMENT OF AGRICULTURE ECONOMIC RESEARCH SERVICE
Marketing Research Report No. 1000

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

ABSTRACT

Tremendous changes in the turkey industry since the 1950's include regional shifts in production and marketing, trends toward a more coordinated industry (increasing use of contract production and other arrangements), expansion and specialization of processing plants, and production of more cut-up parts and further processed products--turkey rolls, roasts, pot pies, and frozen dinners. Other areas discussed are processing costs, prices, per capita consumption, and seasonal supply and demand.

Keywords: Turkey, Processing, Marketing, Costs, Contracts, Consumption.

Washington, D.C. 20250 June 1973

CONTENTS

	Page
HIGHLIGHTS	v
INTRODUCTION	1
Vertical Coordination	1
Marketing	2
PRODUCTION	3
Output	3
Geographic Areas of Production	3
Value of Production	9
Output per Farm	12
Production Costs	12
Changes in Number and Size of Hatcheries	13
PROCESSING	15
Number and Size of Processing Plants	15
Changes in Concentration	17
Processing Costs	21
Impact of Water Pollution Control	22
MARKETING	22
Product Form	22
Surplus and Deficit Areas	26
Shipments of Turkeys	26
Marketing Channels	26
Prices and Price Spreads	31
Consumption and Demand	31
Seasonality of Supply	36
Consumption Projections	36
Condemnations and Yields	39
LITERATURE CITED	41
APPENDIX TABLES	43

TEXT TABLES

Table		Page
1.	Changes in coordination in the turkey industry, 1955-70	2
2.	Turkey production, producer price, value of production, and civilian per capita consumption, 1935-72	4
3.	Number of turkeys raised and percentage change from preceding year, by region, selected years	5
4.	Major turkey-producing States, rank in turkey production, selected years	8
5.	Turkey production and rank of 32 leading counties, 1959, 1964, and 1969	10
6.	Number of farms producing turkeys, total raised or sold, average per farm, by region, 1959, 1964, and 1969	11
7.	Feed conversion and onfarm labor used in turkey production, 1965-72	12
8.	Estimated turkey production and assembly costs for a mixed flock of large turkeys not on contract, 1971	13
9.	Turkey hatcheries and incubator egg capacity, by size group and region, Jan. 1, 1965, 1971, and 1973	14
10.	Number of turkey processing plants under Federal inspection and annual volume of slaughter (live weight), by region and size of plant, 1962 and 1969-72	16
11.	Turkey processing plants, annual average pounds per plant, and turkey as a percentage of total poultry slaughter, by region, 1962-72	18
12.	Share of federally inspected turkey slaughtered by the four, eight, and 20 largest firms and number of plants operated by these firms, 1960, 1964, 1968, 1971, and 1972	21
13.	Number of federally inspected turkey processing firms accounting for specified proportions of output, 1960, 1964, 1968, 1971, and 1972	21
14.	Processing costs in a representative turkey processing plant.	23

Table		Page
15.	Federally inspected slaughter of turkeys, ratio of average monthly volume to volume of peak 2 months as a measure of use of plant capacity, 1965-72	24
16.	Source of waste treatment for plants slaughtering predominantly turkeys and plants slaughtering both turkeys and broilers (with neither predominant), 1970	25
17.	Turkeys processed, by end product, 1962-72	25
18.	Turkey surpluses and shortages, by State and region, selected years	28
19.	Origin of receipts of turkeys, sample of 14 cities, 1972	30
20.	Prices and price spreads for ready-to-cook turkeys in 12 cities, 3-month average (Oct.-Dec.), 1965-72	33
21.	Per capita consumption of turkeys, quarterly, 1960-72	35
22.	Cold-storage holdings of turkeys, 1st of the month, 1955, 1960, and 1965-72	38
23.	Condemnations and yields of turkeys as a percentage of turkeys slaughtered under Federal inspection, 1960-72	40

APPENDIX TABLES

Table		Page
1.	Supply and utilization of turkey, 1950-72	43
2.	U.S. exports of turkey, to selected areas and total, by month, 1962, 1965-72	44
3.	USDA contracts to purchase turkeys, by month, 1960-72	46
4.	Turkey slaughter, August through December, as a percentage of annual total turkey slaughter, by region, 1960-72	47

FIGURES

Figure		Page
1.	Turkeys raised by region as a percentage of U.S. production	6
2.	Turkeys sold, 1969	7
3.	Processing plants slaughtering turkey under Federal inspection, 1972	20
4.	Turkey surpluses and shortages, by State, 1972	27
5.	Major marketing channels for turkey, 1969	32
6.	Percentage shares of retail price of medium-size turkeys	34
7.	Per capita turkey consumption compared with retail price	37

HIGHLIGHTS

The turkey industry is becoming more coordinated and hatcheries and processing plants are increasing in size while decreasing in number, partly as a result of rising costs. In conjunction with these structural changes in the industry, consumption of turkey is increasing.

Increased turkey consumption--from 1.7 pounds per capita in 1935 to 9.1 pounds in 1972--has resulted in part from the industry's promotion of turkey as a food to eat throughout the year rather than just on holidays.

The industry has successfully marketed increased quantities of turkey for use in further processed items such as turkey rolls, roasts, pot pies, and frozen dinners. In 1972, over 35 percent of all turkeys processed were used in such items. Other factors that have tended to increase consumption have been the production of smaller turkeys and the increased marketing of turkey parts. Although three-fourths of turkey consumption is still concentrated in the second half of the year, the share for the first half has been increasing.

Per capita consumption of turkey is projected to continue increasing, with a large share of the increase being in the further processed products. Because turkey is high in protein and low in fat content, it may hold its own against competition from soy and other vegetable protein substitutes.

Although increased consumption has resulted in increased gross farm income from turkeys--$537 million in 1972, compared with $371 million in 1960 and $59 million in 1935--the percentage of total gross farm income from turkeys remains slightly less than 1 percent. The farm price of turkeys has generally decreased from the high of 46.8 cents per pound in 1948. A low of 18.9 cents per pound occurred in 1961. Since 1948, the average annual price has not exceeded 23.1 cents per pound.

With decreasing prices and increasing costs, processors have turned to contracting to better schedule processing and to lower costs; feed firms have promoted contracting to expand sales of feed. In 1970, an estimated 42 percent of all turkeys were produced under contract, up from an estimated 30 percent in 1960. An additional 12 percent of turkeys in 1970 are estimated to have been grown in owner-integrated facilities, and 18 percent more were sold under marketing contracts. Southern producers especially have depended heavily on contract growing for their expansion of turkey production.

To reduce hatching costs, turkey hatcheries have greatly expanded their egg capacity. While the number of hatcheries has decreased, the number with a capacity of 200,000 eggs or more rose from 74 on January 1, 1965, to 83 on January 1, 1973. These 83 hatcheries had an average capacity of 414,000 eggs in 1972.

Turkey processing plants have followed the hatchery pattern of consolidation in recent years. The number of processing plants decreased from 281 in 1962 to 163 in 1972, while volume processed increased from 1,381 million pounds to 2,280 million. Although turkey slaughtering is still highly seasonal, many poultry plants that formerly slaughtered both turkeys and chickens are becoming more specialized in turkeys, especially in the West North Central region. In this region, where the greatest percentage of turkeys is raised, turkey accounted for 93 percent of the poultry slaughtered in these turkey plants.

Changes in industry structure have also included decided shifts in turkey production, as measured by change in regional shares. Since the early 1960's, only the South Atlantic and South Central regions have increased their share of total production. The West North Central region's share has decreased slightly, and the Western and East North Central regions' shares of total production have also decreased. Minnesota, California, and North Carolina ranked highest in that order in turkeys raised in 1972. North Carolina moved up from 12th place in 1960.

Production is also becoming more concentrated in larger units. The 1964 Census of Agriculture reported that farms in the East North Central region had the largest average number of turkeys raised per farm (5,530), ahead of the Western (5,023) and West North Central (4,186) regions. The 1969 Census, which included only data from farms with $2,500 or more sales annually, showed the Western region as raising 30,530 turkeys per farm, followed by the South Atlantic with 24,826 per farm. These figures point to the highly commercial nature of the turkey industry in these two areas.

Regional concentration of turkey production has created an imbalance between supply and demand. The East, a deficit region, receives shipments of turkeys from surplus areas of the Midwest and Central States.

THE TURKEY INDUSTRY: STRUCTURE, PRACTICES, AND COSTS

By

William W. Gallimore and Ruth J. Irvin
Marketing Economics Division
Economic Research Service

INTRODUCTION

The turkey industry has changed substantially since the early 1950's. Although turkeys are produced in several regions, production has become more concentrated in some regions. The number of flocks has decreased, while the average size of flocks has increased. Turkey production and marketing are still highly seasonal, although considerable research and effort have been directed toward spreading production and marketing throughout the year. Only since 1966, have production and processing become noticeably less seasonal.

Vertical Coordination

Turkey production has also become more vertically coordinated--that is, the various stages of production and marketing have become more closely linked. In most areas, processing plants have been increased in size to take advantage of economies of scale, and with the increase in size, marketing agreements and contracts have been used to better schedule production and to assure a dependable supply of turkeys. Feed firms have also used contracts as a means of expanding production. These feed firms have either acquired their own processing facilities or have used contracts or agreements to coordinate their production with processors. Also, processors and feed mills raise turkeys on farms either owned or leased by the firms.

Coordination in the turkey industry has developed differently than in the chicken-broiler industry. Processors have been the major coordinators in the turkey industry. Feed firms have been the prime coordinators in broiler production. Also, cooperatives have probably been more important in the development of the turkey industry than in the chicken-broiler industry (3).[1/] The technical side of production and marketing has been an important factor in the development of coordination in the turkey industry. The grow-out time for mature turkeys is such that the total feed and poult cost may be more than $4 for a 20-pound turkey. The large quantity of feed consumed, combined with the possibility of a great loss if management is poor, has meant that other methods, in addition to contract production, are being used. Production of turkeys on company owned or leased farms is prevalent as well as marketing

1/ Underscored numbers in parentheses refer to items in Literature Cited at the end of this report.

agreements between cooperatives and processors. Estimates for 1970 show that about 42 percent of all turkeys are grown under contract (table 1).

Table 1--Changes in coordination in the turkey industry, 1955-70

Year	Percentage of output involved in--		
	Owner-integrated enterprises	Contract production	Contract marketing
1955	4.0	21.0	11.0
1960	4.0	30.0	16.0
1965	8.0	35.0	13.0
1970	12.0	42.0	18.0

Sources: Unpublished estimates, Poultry Group, U.S. Dept. Agr., MED, Econ. Res. Serv., and (9).

A recent study of contract production in Missouri identified four major types of contract in use in 1968 (11). Production payment contracts accounted for 84 percent of the contracts in Missouri. In this type of contract, ownership of the turkeys remains with the contractor, and the grower is paid a piece wage for output. The payment can include performance incentives based on mortality and feed efficiency or be related directly to cost of production. Floor price contracts accounted for 10 percent of the contracts. In this type of contract, the grower owns the turkeys, takes all the production risk, and shares price risk with the contractor. The contractor agrees to purchase the turkeys at a minimum floor price or a price above, which is related to market price. In marketing contracts, which accounted for 3 percent of all contracts in Missouri, the grower owns the turkeys, and a processor agrees to market the turkeys and return to the grower the net proceeds above processing, storage, and other costs. In profit-share contracts, which accounted for 3 percent of the contracts, the grower and contractor share the profits. Generally, the grower supplies land, equipment, and labor, and the contractor supplies the rest.

Marketing

Turkeys are marketed at different ages and weights, depending on the breed, sex, intended consumer market, and specific market conditions. Fryer-roasters are usually 4 to 8 pounds dressed weight and are special lightweight breeds that mature early and are sold at about 12 to 13 weeks of age. Medium-size turkeys, ranging from 8 to 16 pounds dressed weight, are usually mature hens which are sold at 16 to 18 weeks. Large turkeys--usually toms--are sold at 22-24 weeks of age and range from 16 to 24 pounds dressed weight. Turkeys of this size are generally used by institutions or are further processed into turkey products.

In 1935, gross farm income from turkeys was $59 million, or 0.6 percent of total farm income. By 1972, the income from turkeys had increased to $537 million, or 0.8 percent of total farm income (table 2). Per capita consumption increased from 1.7 pounds in 1935 to 9.1 pounds in 1972.

PRODUCTION

Output

In 1935, 20 million turkeys, about 300 million pounds live weight, were raised. By 1955, production was 65 million turkeys, and by 1972, it had increased to 129 million turkeys, or 2,424 million pounds live weight (table 2). The turkey industry has grown over the years, but there have been wide variations in year-to-year volumes, coupled with considerable producer price changes. In 1961, for example, volume increased by 26 percent over 1960, but decreased 13 percent from 1961 to 1962.

Geographic Areas of Production

Turkeys are raised in most regions of the United States. Major areas of production have been the West North Central and Western regions (table 3). During 1956-71, considerable year-to-year changes in regional production occurred. The pivotal point for changes in regional production followed the record output and depressed prices of 1961 (fig. 1). The South Central region was the only region with an increasing trend in regional shares of production from 1962 to 1972. The South Atlantic, after dipping in 1962, rose steadily until 1969, when it again dipped. Most of the increased production in these two regions was under contract, and many of the growers had not grown turkeys previously (5).

Production within regions is concentrated in certain States (fig. 2). In the West, production has been centered primarily in California, but Oregon, Washington, and Utah are also among the leading States. In the West North Central States, production has been centered in Minnesota, Iowa, and Missouri, and in the South Central States, in Arkansas and Texas. Indiana, Wisconsin, and Ohio are major centers of production in the East North Central States. In the South Atlantic, North Carolina, Virginia, and, to a lesser degree, South Carolina and Georgia produce significant quantities of turkeys.

The ranking of the 12 major turkey-producing States, shown in table 4, gives a measure of changes in geographic areas of production. North Carolina, in the South Atlantic region, moved from sixteenth place in 1955 to third in 1972, while Arkansas, in the South Central, moved from thirteenth to fifth. The industry in the South Atlantic and South Central States has been largely patterned after the chicken-broiler industry--that is, highly coordinated and most of the production under contract. Apparently, the areas emerging into turkey production in these regions have been able to overcome any differential in feed ingredient costs by savings resulting from low transportation rates, a more highly coordinated industry, and mild weather which enables them to utilize a longer ranging season and reduce growing costs (3).

Table 2--Turkey production, producer price, value of production, and civilian per capita consumption, 1935-72

Year	Production			Average price received by producers	Value of production 1/	Civilian per capita consumption
	Number	Live weight	Pounds produced as percentage of preceding year			
	Mil.	Mil lbs.	Percent	Cents/pound	Mil. dol.	Pounds
1935	20	298	99.5	20.1	59	1.7
1936	28	405	136.1	15.6	62	2.2
1937	25	376	92.7	18.1	69	2.3
1938	27	395	105.1	17.5	68	2.3
1939	33	494	125.1	15.7	72	2.5
1940	33	502	101.6	15.2	80	2.9
1941	32	512	102.0	19.9	101	2.9
1942	32	522	101.8	27.5	147	2.0
1943	31	509	97.6	32.7	162	2.7
1944	35	584	114.7	33.9	199	2.7
1945	42	740	126.8	33.7	245	3.5
1946	40	714	96.5	36.3	273	3.7
1947	34	611	85.5	36.5	236	3.6
1948	31	574	94.0	46.8	263	3.1
1949	41	769	134.1	35.2	267	3.3
1950	44	817	106.3	32.9	270	4.1
1951	53	950	116.2	37.5	351	4.4
1952	62	1,049	110.5	33.6	356	4.7
1953	60	1,008	96.1	33.7	340	4.8
1954	68	1,161	115.1	28.8	334	5.3
1955	65	1,091	94.0	30.2	329	5.0
1956	77	1,274	116.8	27.2	342	5.2
1957	81	1,356	106.4	23.4	319	5.9
1958	79	1,356	100.0	23.9	322	5.9
1959	84	1,433	105.7	23.9	345	6.3
1960	84	1,489	103.9	25.4	371	6.1
1961	107	1,871	125.7	18.9	356	7.4
1962	92	1,626	86.9	21.6	352	7.0
1963	94	1,686	103.7	22.3	377	6.8
1964	101	1,826	108.3	21.0	383	7.4
1965	106	1,915	104.9	22.2	424	7.4
1966	116	2,123	110.9	23.1	490	7.8
1967	126	2,343	110.4	19.5	458	8.6
1968	107	2,015	86.0	20.5	414	8.0
1969	107	2,029	100.7	22.4	455	8.3
1970	116	2,203	108.6	22.6	499	8.2
1971	120	2,264	102.8	22.1	501	8.5
1972	129	2,424	107.1	22.2	537	9.1

1/ Gross income from turkeys.

Sources: Turkeys: Production, Disposition, Cash Receipts, and Gross Income, U.S. Dept. Agr., Statis. Rptg. Serv., various issues; and Poultry and Egg Situation, U.S. Dept. Agr., Econ. Res. Serv., various issues.

Table 3--Number of turkeys raised and percentage change from preceding year, by region, selected years

Region	1959		1961		1965		1967	
	Number raised	Percentage change from previous year	Number raised	Percentage change from previous year	Number raised	Percentage change from previous year	Number raised	Percentage change from previous year
	Thou.	Percent	Thou.	Percent	Thou.	Percent	Thou.	Percent
North Atlantic	3,531	- 3.1	3,601	8.1	3,265	5.2	3,469	- 2.5
East North Central	13,136	15.2	16,695	32.4	15,427	- 1.2	15,675	- 2.4
West North Central	28,679	19.9	38,726	29.5	35,321	5.1	40,683	8.3
South Atlantic	12,069	0.4	11,320	24.5	15,420	8.4	18,459	3.4
South Central	7,777	- 6.1	11,085	33.1	13,487	13.6	17,864	9.5
West	19,301	- 4.9	26,322	24.2	22,764	1.0	28,239	12.9
Other States 1/	NA	NA	NA	NA	NA	NA	2,248	NA
United States	84,493	6.2	107,749	27.6	105,230	4.8	126,577	8.6

Region	1969		1970		1971		1972	
	Thou.	Percent	Thou.	Percent	Thou.	Percent	Thou.	Percent
North Atlantic	2,851	1.9	3,102	8.8	3,452	11.3	3,514	1.8
East North Central	12,431	- 6.3	14,573	17.2	14,458	- 0.8	15,896	9.9
West North Central	33,267	- 3.7	35,554	6.9	36,934	3.9	40,914	10.8
South Atlantic	18,979	10.3	20,185	6.4	21,024	4.2	23,194	10.3
South Central	14,368	- 2.4	17,421	21.2	18,080	3.8	17,908	- 1.0
West	23,060	3.2	25,180	9.2	25,983	3.2	27,325	5.2
Other States 1/	1,780	NA	386	NA	195	NA	57	NA
United States	106,736	0.0	116,401	9.1	120,126	3.2	128,808	7.2

NA = not available.

1/ Florida, Montana, Idaho, Wyoming, New Mexico, and Arizona are combined to avoid disclosing individual operations.

Source: Turkeys: Production, Disposition, and Income, U.S. Dept. Agr., Statis. Rptg. Serv., various issues.

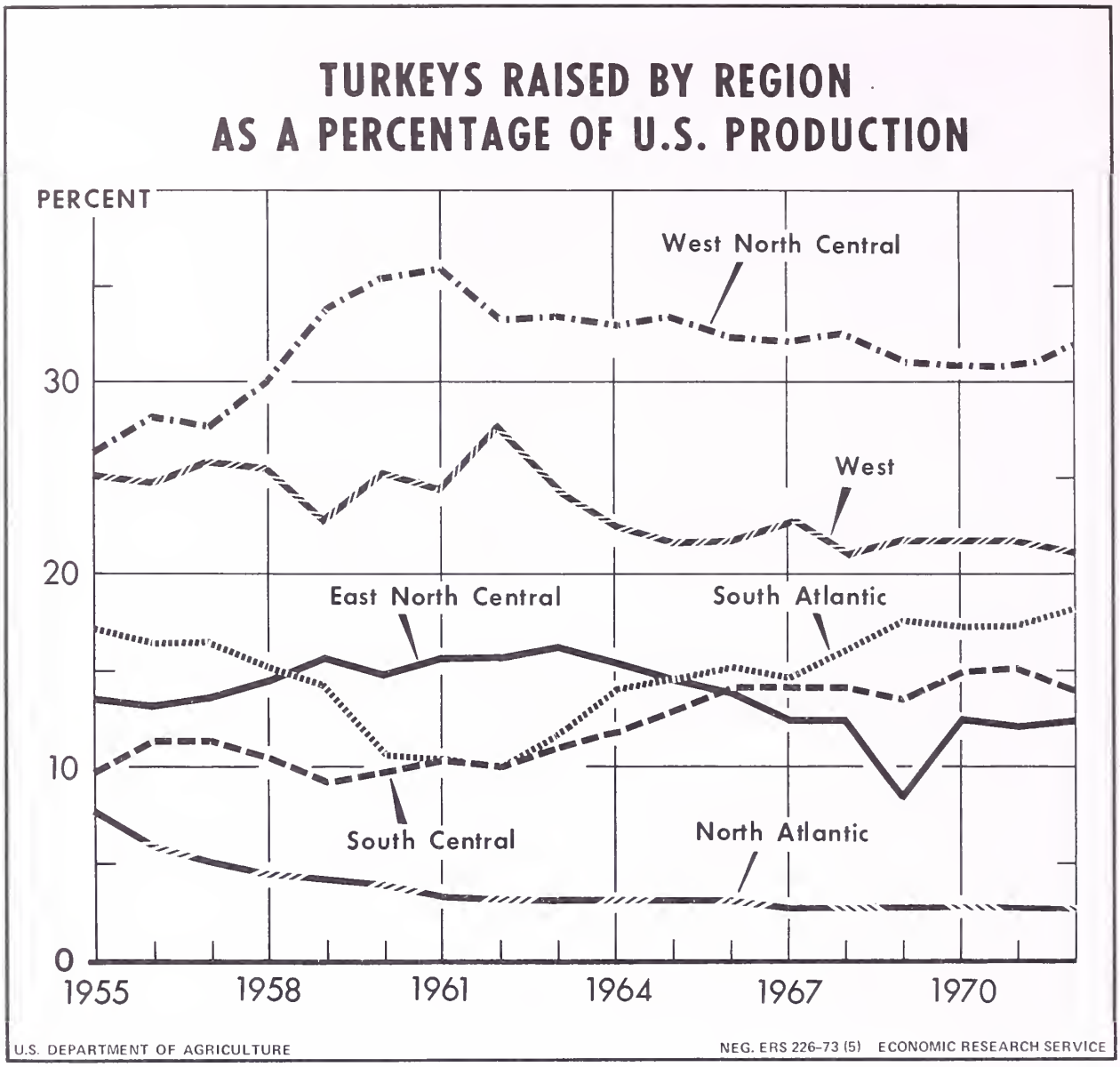

TURKEYS RAISED BY REGION
AS A PERCENTAGE OF U.S. PRODUCTION
PERCENT
30
20
10
0
1955
1958
1961
1964
1967
1970
West North Central
West
East North Central
South Atlantic
South Central
North Atlantic
U.S. DEPARTMENT OF AGRICULTURE
NEG. ERS 226-73 (5) ECONOMIC RESEARCH SERVICE

Figure 1

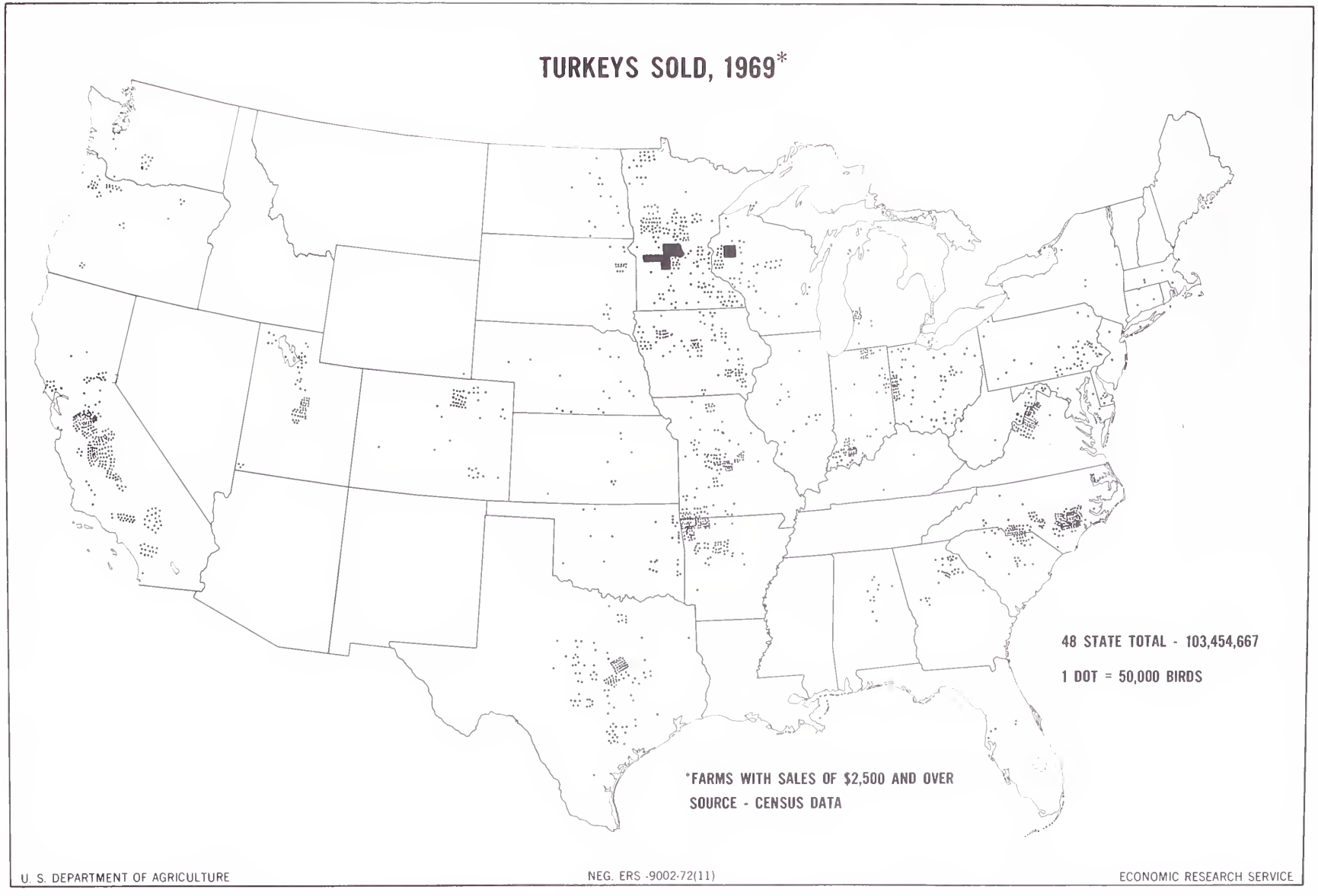

TURKEYS SOLD, 1969*
48 STATE TOTAL - 103,454,667
1 DOT = 50,000 BIRDS
*FARMS WITH SALES OF $2,500 AND OVER
SOURCE - CENSUS DATA
U. S. DEPARTMENT OF AGRICULTURE
NEG. ERS -9002-72(11)
ECONOMIC RESEARCH SERVICE

Figure 2

Table 4--Major turkey-producing States, rank in turkey production, selected years

State	Rank in turkey production							
	1955	1960	1965	1967	1969	1970	1971	1972
Minnesota	2	2	2	2	1	1	1	1
California	1	1	1	1	2	2	2	2
North Carolina	16	12	9	7	3	3	3	3
Missouri	8	5	4	3	4	5	4	4
Arkansas	13	11	8	4	6	6	6	5
Texas	5	7	7	5	5	4	5	6
Iowa	4	3	3	6	7	7	7	7
Indiana	11	9	10	10	10	8	9	8
Virginia	3	4	5	8	8	9	8	9
Ohio	6	8	11	11	9	10	10	10
Wisconsin	10	6	6	9	12	12	12	11
Utah	7	10	12	12	11	11	11	12

Source: Turkeys: Production, Disposition, and Income, U.S. Dept. Agr., Statis. Rptg. Serv., various issues.

The relative profitability of growing turkeys versus other enterprises is a very important factor causing interregional shifts in turkey production. The Midwestern States, because of their soil, have a natural advantage in producing crops. Therefore, cheaper feed ingredients are available in this region. The question, though, is not necessarily whether these States can produce turkeys at a greater profit than those in another region, but whether it is more profitable to devote their resources to producing turkeys or to some other enterprise. In some areas of the South Atlantic and South Central regions, less productive soil and limited off-farm employment make turkeys a more attractive enterprise.

The concentration of turkey production within States is shown in figure 2. Each dot represents 50,000 turkeys. Production in Virginia is concentrated in one area--the Shenandoah Valley. In North Carolina, production is centered in two areas, but covers only a few counties. This pattern of concentration is true for most States, but in Iowa and Minnesota, there are several production centers dispersed throughout each State.

This concentration of production is further illustrated by counties in table 5. Data from the 1969 Census of Agriculture show Duplin County, N.C., ranked number one, increasing from 23d in just 10 years and accounting for 40 percent of North Carolina's 1969 production. McLennan County, Tex., moved from a ranking of 31 in 1959 to sixth in 1969. The second-, third-, and fourth-ranked counties in 1959, in the older production areas of California and Minnesota, held about the same ranking during the 10-year period. However, based on these top 32 counties, some differences are evident between California and Minnesota. Minnesota had three counties below the fifth ranking, two of which moved up several ranks between 1959 and 1969, and the other which moved up one rank. California had six counties below fifth place, one of which moved from 14th to 13th and five which dropped in rank.

Value of Production

Value of production, generally obtained by multiplying the average price received by producers by the live weight pounds produced (table 2), increased each year from 1938 to 1952, except in 1946-47. It reached a high of $356 million in 1952, then declined and did not surpass this level until $371 million was reached in 1960. Although total turkey production increased some years during 1952-60, the decline in farm prices offset much of the production gains. Farm prices reached a high in 1948 of 46.8 cents per pound, declined to 18.9 cents in 1961, and have generally remained in the low twenties since then.

Value of production to contract growers is calculated differently since other factors are involved. Rather than multiplying production by market price, contract growers multiply production by the total fee received plus bonus paid by the contract. Contract growers usually furnish housing, equipment, labor, and utilities. The contractor furnishes the turkeys, feed, medication, and other miscellaneous items, such as insurance. The title to the turkeys usually remains with the contractor. Many payment plans are in use, but most guarantee a minimum fee to the grower per pound or per head, with a bonus based on efficiency, market price, or other factors. A comparison of grower returns under different production arrangements is found in a 1968 USDA publication (4).

Table 5--Turkey production and rank of 32 leading counties, 1959, 1964, and 1969

County	Production numbers			Rank		
	1959	1964	1969	1959	1964	1969
Duplin, N.C.	250,248	797,539	3,497,636	23	19	1
Stanislaus, Calif.	1,451,959	2,172,246	2,705,699	4	3	2
Fresno, Calif.	2,093,782	2,130,857	2,455,829	3	5	3
Kandiyohi, Minn.	2,143,109	2,336,371	2,376,858	2	2	4
Rockingham, Va.	3,208,696	3,717,173	2,053,051	1	1	5
McLennan, Tex.	57,976	55,489	1,901,327	31	32	6
Swift, Minn.	196,015	487,160	1,792,041	27	25	7
Sanpete, Utah	877,057	1,452,805	1,686,648	8	6	8
Barron, Wis.	786,932	1,349,109	1,619,285	11	8	9
Stearns, Minn.	508,011	1,279,454	1,613,516	18	9	10
Weld, Colo.	247,702	670,897	1,465,676	24	21	11
Otter Tail, Minn.	744,746	1,110,886	1,462,011	13	13	12
Madera, Calif.	695,860	1,040,675	1,385,586	14	15	13
Sampson, N.C.	216,752	337,545	1,333,373	25	28	14
Benton, Ark.	280,393	407,919	1,259,194	22	27	15
Dubois, Ind.	784,470	1,231,723	1,121,836	12	10	16
Miller, Mo.	212,152	669,003	1,107,760	26	22	17
Washington, Ark.	540,464	1,034,585	1,103,754	17	16	18
Tulare, Calif.	802,777	1,161,170	1,084,912	9	11	19
Merced, Calif.	1,446,549	1,396,636	1,049,260	5	7	20
Carroll, Ark.	484,209	1,016,160	1,044,875	19	17	21
San Bernardino, Calif.	642,991	719,377	968,025	15	20	22
Bell, Tex.	95,624	610,672	948,306	30	23	23
Ottawa, Mich.	330,601	609,656	848,371	21	24	24
Los Angeles, Calif.	802,376	2,166,720	847,496	10	4	25
Union, N.C.	342,185	419,317	770,935	20	26	26
Elkhart, Ind.	598,947	1,076,959	762,386	16	14	27
Shenandoah, Va.	884,669	814,477	741,602	7	18	28
Osage, Mo.	187,529	320,015	733,120	28	29	29
Pope, Ark.	11,100	192,232	709,184	32	30	30
Chesterfield, S.C.	124,474	154,486	704,492	29	31	31
Riverside, Calif.	914,276	1,124,332	678,583	6	12	32

Source: Census of Agriculture, Vol. I Area Reports for Each State, 1959 and 1969.

Table 6--Number of farms producing turkeys, total raised or sold, average per farm, by region, 1959, 1964, and 1969

Item	North Atlantic	East North Central	West North Central	South Atlantic	South Central	West	United States
				Number			
Farms in--							
1959	4,523	5,550	13,659	14,741	38,118	10,121	86,712
1964	2,091	3,109	8,054	6,232	17,802	4,538	41,826
1969 1/	544	936	1,624	708	872	740	5,424
				Thousand			
Turkeys raised in--							
1959	3,492	13,164	27,735	11,778	7,376	18,970	82,517
1964	3,310	17,194	33,716	15,539	12,196	22,795	104,750
1969 1/	2,885	14,328	30,632	17,576	15,442	22,592	103,455
				Number			
Turkeys per farm in--							
1959	772	2,372	2,031	799	194	1,874	952
1964	1,583	5,530	4,186	2,493	685	5,023	2,504
1969 1/	5,304	15,307	18,862	24,826	17,708	30,530	19,074

1/ Turkeys sold on farms with annual sales of $2,500 or more.

Output per Farm

Based on census data, the number of farms producing turkeys dropped from almost 87,000 in 1959 to about 42,000 in 1964. The average number of turkeys raised per farm increased from 952 in 1959 to 2,504 in 1964 (table 6). In 1959, the Western, East North Central, and West North Central regions raised the largest number of turkeys per farm. The South Atlantic and South Central regions showed the greatest increase relative to the U.S. average from 1959 to 1964.

Data are shown for the 1969 census but are not comparable to previous data because only farms with more than $2,500 annual gross sales are included for 1969 and the number of turkeys sold per farm, rather than turkeys raised, is used. The figures for 1969 are more nearly representative of larger units. The comparability of the South Atlantic and South Central regions to the older production regions in output per farm indicates the scale of the enterprise in these regions. Because much of the production is on contract in these regions, number of turkeys per farm probably understates the size of operation.

Production Costs

Production costs have probably decreased along with the decrease in farm price, but there is no series which shows this. Table 7 shows the increase in efficiency of feed conversion and labor for turkey production. However, these data should be used primarily to show trends, as many large producers are more efficient. Contributing to this increased efficiency has been decreased mortality due to better management and availability of vaccines and drugs for disease prevention and treatment.

Table 7--Feed conversion and onfarm labor used in turkey production, 1965-72

Year	Pounds of feed per pound live weight	Hours per 100 pounds
1965	4.76	1.59
1966	4.54	1.39
1967	4.41	1.20
1968	4.59	1.13
1969	4.47	1.06
1970	4.05	1.00
1971	4.13	.93
1972	4.05	.83

Source: Farm Production Economics Division, Econ. Res. Serv., U.S. Dept. Agr.

Turkey production costs are also affected by other factors. Hens and toms are sold at different ages and weights, and fryer-roasters at much lighter weights than hens or toms. The method of growing may be in confinement or on range, and the duration of the growing period affects the utilization of fixed

facilities and thus costs. Turkeys may be grown under contract, company grown, or grown independently. Many large growers of turkeys produce their own grain and mix their own feed, thus creating a different structure of feed costs from those in ordinary commercial channels or in contractual arrangements.

The cost of producing turkeys was synthesized for a mixed flock of large turkeys not on contract (table 8). This synthesized cost is based on 1971 published figures and industry estimates and is intended primarily to illustrate the relative cost items to producers. To make the budget items representative of contract costs, a contract payment would have to be substituted in place of the labor charge and other items furnished by the grower and feed costs adjusted. Industry sources estimate an additional cost of about 1 cent per pound more to raise fryer-roasters rather than heavy turkeys.

Table 8--Estimated turkey production and assembly costs for a mixed flock of large turkeys not on contract, 1971 1/

Item	Dollars per pound live weight
Poults, $.58 each	0.0320
Feed--3.5 feed conversion, $82.00/ton	.1435
Fixed costs	.0100
Labor costs	.0195
Medication, debeaking, sanitation	.0050
Utilities and miscellaneous	.0075
Financing charge on operating capital	.0030
Assembly	.0050
Total	.2255

1/ Assumes 20-pound live weight and mortality of 10 percent. Coefficients based on studies and information from private industry sources.

Source: Unpublished data prepared by Poultry Group, Mktg. Econ. Div., Econ. Res. Serv., U.S. Dept. Agr., 1971.

Feed cost, the largest production cost, accounts for about 64 percent of the budgeted cost. (This percentage will vary, depending on the factors that affect feed costs). Poult cost is the next largest, representing about 14 percent of the total production costs. Another cost is the assembly cost, which represents labor and other expenses for catching the turkeys at the farm and transporting them to the processing plant. This cost will vary, depending on density of production, method of catching, and distance from the production area to the processing plant.

Changes in Number and Size of Hatcheries

Turkey hatcheries are becoming fewer in number but larger in size. The total number of turkey hatcheries decreased from 453 on January 1, 1965, to 203 on January 1, 1973, but total capacity of the incubators in these hatcheries decreased only slightly (table 9). Average capacity increased from 113,000 in

Table 9--Turkey hatcheries and incubator egg capacity, by size group and region, Jan. 1, 1965, 1971, and 1973

Date and egg capacity	North Atlantic	East North Central	West North Central	South Atlantic	South Central	West	United States 1/
			Number of hatcheries				
Jan. 1, 1965:							
Less than 25,000	41	15	24	7	8	23	118
25,000-59,000	16	18	30	5	11	22	102
60,000-99,000	2/15	8	24	10	8	15	2/ 80
100,000-199,000	--	11	27	9	17	15	79
200,000 or more	--	10	18	12	9	25	74
Total	72	62	123	43	53	100	453
Jan. 1, 1971:							
Less than 25,000	16	3/ 7	3/	4	5/15	5/	42
25,000-59,000	8	3/22	3/	--	5/14	5/	44
60,000-99,000	2/ 8	3/ 4	3/	4/6	5/ 4	5/	22
100,000-199,000	--	3/19	3/	8	5/33	5/	60
200,000 or more	--	3/38	3/	15	5/31	5/	84
Total	32	3/90	3/	33	5/97	5/	252
Jan. 1, 1973:							
Under 60,000	16	12	10	3	13	10	64
60,000-199,000	6/ 7	6/19	10	7	21	8	56
200,000 or more	--	--	26	14	5	22	83
Total	23	31	46	24	39	40	203
			Incubator egg capacity (Thou.)				
Jan. 1, 1965:							
Less than 25,000	406	218	284	103	105	340	1,456
25,000-59,000	557	703	1,228	208	406	860	3,962
60,000-99,000	2/1,496	573	2,143	788	619	1,195	2/6,814
100,000-199,000	--	1,439	4,113	1,267	2,207	1,985	11,011
200,000 or more	--	3,281	6,891	5,235	2,875	9,560	27,842
Total	2,459	6,214	14,659	7,601	6,212	13,940	51,085
Jan. 1, 1971:							
Less than 25,000	167	3/ 81	3/	55	5/ 194	5/	497
25,000-59,000	282	3/ 835	3/	--	5/ 538	5/	1,700
60,000-99,000	2/1,049	3/ 327	3/	4/ 390	5/ 273	5/	1,099
100,000-199,000	--	3/ 2,812	3/	1,105	5/ 5,680	5/	10,027
200,000 or more	--	3/16,387	3/	6,135	5/12,953	5/	35,940
Total	1,498	3/20,442	3/	7,685	5/19,638	5/	49,263
Jan. 1, 1973:							
Under 60,000	355	441	330	42	358	345	1,871
60,000-199,000	6/1,072	6/5,629	1,411	808	3,942	988	8,389
200,000 or more	--	--	12,713	5,757	1,944	8,514	34,389
Total	1,427	6,070	14,454	6,607	6,244	9,847	44,649

1/ Does not include Alaska and Hawaii. 2/ Hatcheries in the North Atlantic with 100,000 or more capacity included to avoid disclosing individual operations. 3/ East North Central and West North Central combined to avoid disclosing individual operations. 4/ Hatcheries in the South Atlantic with 25,000 to 59,000 capacity included to avoid disclosing individual operations. 5/ South Central and West combined to avoid disclosing individual operations. 6/ Hatcheries in the North Atlantic and East North Central regions with 60,000 or more capacity combined to avoid disclosing individual operations.

Sources: Hatchery Production, October 1965; Eggs, Chickens and Turkeys, March 1971 and 1973, Statis. Rptg. Serv., U.S. Dept. Agr.

1965 to 220,000 in 1972. There was an increase of hatcheries in only one size category--those with an incubator capacity of 200,000 or more eggs. Hatcheries in this category increased from 74 to 83. The average incubator capacity for these 83 hatcheries in 1972 was 414,325.

Many factors probably contributed to the shift to larger hatcheries, including changes in industry organization and coordination, but the underlying cause is the decrease in hatching cost as size increases. A previous study, synthesizing costs for different size hatcheries over a 34-week hatching season, found that cost of hatching turkey poults decreased from 5.1 cents per poult when 319,738 salable poults were produced to 3.7 cents when 1,598,688 were produced (10).

PROCESSING

All data on plant numbers and volume are for plants under Federal inspection which slaughtered young chickens, mature chickens, turkeys, and other miscellaneous poultry. Some plants slaughtered only turkeys, but many slaughtered two or more classes of poultry. If a plant processed any turkeys, it is classified as a turkey processing plant.

Number and Size of Processing Plants

In 1962, 281 plants processed 1,381 million pounds of turkey. By 1970, 156 plants processed 1,988 million pounds. In 1971, the number of plants increased to 174, and 2,085 million pounds of turkey were processed (table 10). The data for 1972 in table 10 show plant numbers decreasing to 163 and total pounds processed increasing to 2,280 million pounds.

Changes in numbers of plants in certain size categories may occur because a plant has stopped processing turkeys, there is a change in volume processed, or a plant previously not under Federal inspection is included in the program.

The number of processing plants increased in 1971 primarily because of changes in inspection requirements. By July 1, 1971, plants shipping intrastate had to meet either Federal or State inspection requirements, and State requirements had to equal Federal standards. Because many States elected to have Federal inspection, a number of plants were added to the roster of federally inspected plants. Most of the increase occurred in plants processing less than 5,200,000 pounds annually, and the largest increase in plant numbers was in the North Atlantic. Until 1971, plant numbers had trended downward, and this trend will probably continue after the influx of small plants formerly not Federally inspected has ceased.

From 1962 to 1970, there was an increase in processing plants with an annual volume greater than 15.6 million pounds. For plants with annual volumes below 5.2 million pounds, there was a decrease from 194 to 68 plants. For all regions, plants in the largest size category accounted for an increasing share of the total processed.

The average pounds processed per plant increased from 4.9 million in 1962 to 12.7 million in 1970, decreased slightly to 12.0 million in 1971, and then

Table 10--Number of turkey processing plants under Federal inspection and annual volume of slaughter (live weight), by region and size of plant, 1962 and 1969-72

Region	Number of plants by annual volume (lbs.)				Annual volume (lbs.)			
	Less than 5,200,000	5,200,000 to 15,599,000	15,600,000 and over	Total	Less than 5,200,000	5,200,000 to 15,599,000	15,600,000 and over	Total
	Number				Million pounds			
1962:								
North Atlantic	36	1/	0	1/36	30	1/	0	1/30
East N. Central	53	1/8	2/	2/61	69	1/66	2/	2/135
West N. Central	35	22	2/12	2/69	54	202	2/269	2/525
South Atlantic	24	8	0	32	26	85	0	111
South Central	26	8	3/	3/34	32	78	3/	3/110
West	20	16	3/13	3/49	15	145	3/310	3/470
United States	194	62	25	281	226	576	579	1,381
1969:								
North Atlantic	12	10	0	22	1	44	0	45
East N. Central	10	16	4	30	3	93	101	197
West N. Central	6	22	14	42	1	195	378	574
South Atlantic	2	10	7	19	1	57	249	307
South Central	8	11	6	25	1	64	210	275
West	3	19	10	32	4/	132	278	410
United States	41	88	41	170	7	585	1,215	1,807
1970:								
North Atlantic	17	4	0	21	13	37	0	50
East N. Central	15	8	5	28	16	74	142	232
West N. Central	7	12	17	36	7	161	446	614
South Atlantic	9	5/	8	17	10	5/	261	271
South Central	10	5/5	7	22	20	5/63	252	335
West	10	12	10	32	17	146	323	486
United States	68	41	47	156	83	481	1,424	1,988
1971:								
North Atlantic	28	5	0	33	11	46	0	57
East N. Central	17	5	4	26	15	52	149	216
West N. Central	10	9	20	39	8	121	542	671
South Atlantic	7	2	9	18	6	15	311	332
South Central	10	5	6	21	14	53	253	320
West	15	9	13	37	13	96	380	489
United States	87	35	52	174	67	383	1,635	2,085
1972:								
North Atlantic	23	4	0	27	14	43	0	57
East N. Central	16	3	6	25	16	28	200	244
West N. Central	11	7	23	41	3	88	686	777
South Atlantic	5	3	9	17	4	28	346	378
South Central	10	3	7	20	11	27	277	315
West	11	10	12	33	8	113	388	509
United States	76	30	57	163	56	327	1,897	2,280

1/ Plants and volume for North Atlantic and East North Central regions have been combined to avoid disclosure of individual plants.

2/ Plants and volume for East North Central and West North Central regions have been combined to avoid disclosure of individual plants.

3/ Plants and volume for South Central and Western regions have been combined to avoid disclosure of individual plants.

4/ Less than 500,000 pounds.

5/ Plants and volume for South Atlantic and South Central regions have been combined to avoid disclosure of individual plants.

Source: Compiled from unpublished data, U.S. Dept. Agr., Consumer and Mktg. Serv., Poultry Div. (Due to reorganization within the Department of Agriculture, the Consumer and Marketing Service (given as a source for this and other tables) no longer exists as a unit. Its functions have been allotted to other agencies, including Food and Nutrition Service and Agricultural Marketing Service.)

increased to 14 million in 1972, (table 11). Again, the influx of small plants caused the decrease in average pounds processed. The greatest percentage decrease in average annual pounds was in the North Atlantic region, which had the greatest increase in number of plants. Average pounds processed per plant decreased from 2.4 to 1.7 million.

Plants processing turkeys are becoming more specialized (table 11). In 1962, turkey accounted for about 46 percent of the poultry slaughtered in turkey processing plants, but by 1972, it accounted for 71 percent. Plants in the West North Central region are the most highly specialized, with turkeys accounting for 98 percent of their output. Turkey currently comprises about 15 percent of the poultry slaughtered in processing plants in the North Atlantic region, primarily because turkey slaughter is highly seasonal and is handled in plants processing other types of poultry.

In 1972, turkeys accounted for 55 percent of poultry processed in South Atlantic plants, compared with only 19 percent in 1962. The South Atlantic is a large broiler-producing region, and although the turkey industry there has grown tremendously in the past few years, many plants still handle both broilers and turkeys. For new turkey-producing areas, multiuse plants may be the shortrun answer for supplying processing facilities. However, processing both broilers and turkeys in the same plant does present organizational and technical problems, and the trend in all areas is toward plants processing only turkeys.

Plants processing only turkeys and those where turkey is the predominate poultry class processed are shown in figure 3. Fifty-six percent of all plants processing turkeys processed only turkeys and accounted for 70 percent of the turkeys processed. Generally, the more specialized plants are located in the older areas of production. For example, California and Minnesota, two established major producing States, have mainly specialized plants. In contrast, North Carolina, a newer producing State, has a much higher proportion of plants processing other poultry along with turkeys.

Changes in Concentration

One method for measuring concentration in an industry is comparing the percentages of total volume handled by a specified number of firms in different time periods. A typical procedure is to measure the value or physical product handled by the four, eight, and 20 largest firms, as was done in table 12. There was almost no change in the percentage processed by the three groups of firms from 1960 to 1964, but the number of plants owned by these firms decreased. This decrease possibly reflected a period of internal reorganization by the major firms, with a closing or selling of certain plants. From 1964 to 1968, the percentage of turkeys processed by the larger firms increased, indicating a greater concentration of the processing industry. Also, during this period, the number of plants owned by the 20 largest firms remained about constant. From 1968 to 1972, there was a slight increase in the percentage processed by the four, eight, and 20 largest firms, but as in the previous leveling-off period, the number of plants operated by these firms declined somewhat.

Table 11--Turkey processing plants, annual average pounds per plant, and turkey as a percentage of total poultry slaughter, by region, 1962-72 1/

Region	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
	Number of processing plants										
North Atlantic	37	37	34	31	29	30	27	22	21	33	27
East N. Central	62	50	46	43	38	36	34	30	28	26	25
West N. Central	67	59	58	52	52	52	46	42	36	39	41
South Atlantic	32	41	33	28	26	27	25	19	20	18	17
South Central	36	33	31	32	30	30	27	25	19	21	20
West	47	47	42	38	37	38	34	32	32	37	33
United States	281	267	244	224	212	213	193	170	156	174	163
	Average pounds per plant										
North Atlantic	946	994	1,232	1,591	1,533	1,677	1,593	2,053	2,367	1,747	2,107
East N. Central	3,046	3,882	4,216	4,629	5,304	6,710	6,115	6,553	8,275	8,295	9,803
West N. Central	6,949	8,567	9,763	11,518	12,293	13,250	12,802	13,655	17,073	17,207	18,923
South Atlantic	3,457	3,352	5,254	6,966	8,904	9,667	11,212	16,175	15,733	18,460	22,249
South Central	4,013	5,368	6,791	7,222	9,428	10,968	10,527	10,989	15,350	15,245	15,731
West	9,246	8,686	9,198	10,394	12,386	13,831	12,586	12,815	15,183	13,223	15,425
United States	4,908	5,465	6,470	7,448	8,764	9,843	9,494	10,632	12,745	11,989	13,986

Continued

Table 11--Turkey processing plants, annual average pounds per plant, and turkey as a percentage of total poultry slaughter, by region, 1962-72 1/--Continued

Region	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
	Percent of total poultry slaughter										
North Atlantic....	10.5	10.1	14.9	17.9	17.6	18.4	16.2	20.7	17.1	15.0	20.7
East N. Central...	50.5	57.2	58.8	64.0	74.6	84.4	78.7	79.9	79.3	81.9	84.5
West N. Central...	78.6	84.9	87.7	92.9	92.9	89.4	88.4	90.9	96.0	92.8	98.4
South Atlantic....	19.0	18.4	23.5	31.1	31.1	34.2	36.1	42.4	41.5	53.8	55.5
South Central.....	30.2	32.9	36.3	35.0	41.8	44.0	42.9	49.0	68.4	55.2	56.4
West.....	71.8	71.6	93.7	81.3	79.7	80.9	80.9	78.5	78.4	78.0	82.0
United States ..	46.5	46.3	50.8	55.5	59.5	60.1	57.9	62.3	65.7	65.3	70.9

1/ Turkey processing plants are those slaughtering any turkey.

Source: Compiled from unpublished data, U.S. Dept. Agr., Consumer and Mktg. Serv., Poultry Div.

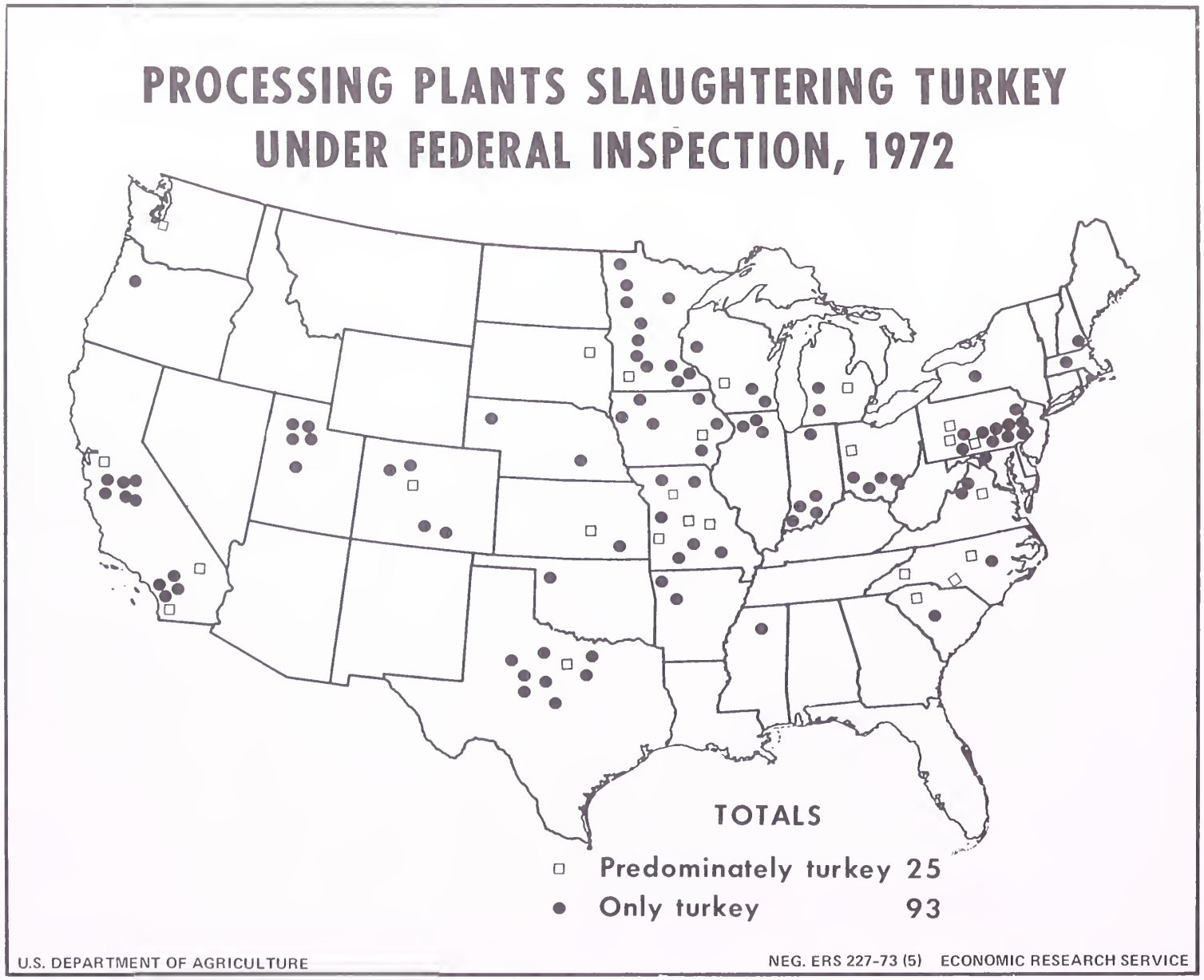

PROCESSING PLANTS SLAUGHTERING TURKEY
UNDER FEDERAL INSPECTION, 1972
TOTALS
Predominately turkey 25
Only turkey 93
U.S. DEPARTMENT OF AGRICULTURE
NEG. ERS 227-73 (5) ECONOMIC RESEARCH SERVICE

Figure 3

Table 12--Share of federally inspected turkey slaughtered by the four, eight, and 20 largest firms and number of plants operated by these firms, 1960, 1964, 1968, 1971, and 1972

Firm size	1960	1964	1968	1971	1972
			Percent		
Share of federally inspected turkey slaughtered by--					
4 largest firms	22	22	30	30	32
8 largest firms	32	33	44	44	46
20 largest firms	50	51	65	68	72
			Number		
Number of plants operated by:					
4 largest firms	34	29	30	21	23
8 largest firms	41	37	38	29	32
20 largest firms	60	56	54	43	49

Another way of looking at concentration is to determine the number of firms required to handle specified percentages of total industry output. This method shows concentration by size of firm and the situation for all firms rather than for just a select number (table 13). The data in table 13 also indicate most of the increased concentration between 1964 and 1968, with little change from 1968 to 1972. Table 13 does indicate a large increase in the

Table 13--Number of federally inspected turkey processing firms accounting for specified proportions of output, 1960, 1964, 1968, 1971, and 1972

Percent of output	1960	1964	1968	1971	1972
			Number of firms		
30	6	6	4	4	4
50	18	17	10	10	9
70	40	35	21	21	19
80	57	48	30	28	26
90	87	69	43	40	38
95	121	93	53	48	48
100	249	189	102	148	163

number of small plants from 1968 to 1972, because the small firms have only one plant. This increase contrasts with the decrease in number of small plants during 1960-68. The reason for this increase, as discussed on page 15, is the influx of plants formerly not federally inspected.

Processing Costs

Studies of turkey processing indicate that substantial economies of scale exist--that is, average processing costs are reduced as size of plant is

increased. However, processing costs are affected by factors other than size, such as percentage of capacity utilized and the type of turkey processed. Most of the reduction in per unit operating cost due to scale is reached at 30 to 40 million pounds per year, which is about three times the U.S. average volume per plant. If assembly and distribution costs were included, the minimum costs would probably be higher (12).

Processing costs for three classes of turkeys are given in table 14. These costs were adapted from the work cited from the table primarily by increasing costs by an index. These costs are based on a 50-percent utilization of capacity, which is representative of the turkey processing industry (table 15). An increase in utilization of capacity would lower average fixed costs and thus, lower total average costs. In table 15, utilization of plant capacity is measured as the ratio of the average monthly volume processed to the average volume processed during the peak 2 months. While this method ignores such factors as the availability of labor over the 12-month period and downtime needed for putting the plant in order, it does indicate that excess capacity exists in turkey processing.

Impact of Water Pollution Control

Efforts to improve our environment by reducing the amount of untreated waste discharged from poultry plants will have an impact on turkey processing costs. The 1970 source of waste treatment for federally inspected plants slaughtering predominantly turkeys or a combination of turkeys and broilers, with neither predominant, is shown in table 16.

More of the plants processing both turkeys and broilers relied on private treatment than did specialized turkey plants. In the survey, 32 of the turkey plants had private treatment, but of these, 10 had only primary treatment. Most of the plants with primary treatment were relatively small plants.

Based on an estimated average total plant processing cost of $5.27 per hundred pounds live weight, 1970 operating and maintenance costs of private waste-water treatment facilities ranged from 0.5 to 1.4 percent of turkey plant costs. Estimates of operating and maintenance costs of the best available technology ranged from 1.6 to 4.3 percent of average total turkey plant costs. The impact of these increased costs will probably be some increase in prices. Because of the large outlays of capital involved for many plants, some of the smaller ones may cease operation (16).

MARKETING

Product Form

Turkeys are marketed primarily as frozen, ready-to-cook (RTC) whole birds, cut-up parts, or as further processed products, such as rolls, pot pies, and frozen dinners. During the Thanksgiving and Christmas holidays, a limited number of turkeys are marketed fresh dressed. Many of the fresh turkeys come from small, local processors who do not ship interstate. Until recently, these processing plants were not required to be federally inspected.

Table 14--Processing costs in a representative turkey processing plant 1/

Cost item	Cost per pound RTC (ready-to-cook)	
Heavy hens:		
Variable operating costs 2/	.02940	
Constant-unit operating costs 3/	.02587	
Fixed operating costs 3/	.01532	
Fixed overhead costs 3/ 4/	.01422	
Total 5/	.08481	(.07895)
Heavy toms:		
Variable operating costs 2/	.02317	
Constant-unit operating costs 3/	.02402	
Fixed operating costs 3/	.01208	
Fixed overhead costs 3/ 4/	.01245	
Total 5/	.07172	(.06586)
Fryer-roasters:		
Variable operating costs 2/	.03954	
Constant-unit operating costs 3/	.02772	
Fixed operating costs 3/	.01919	
Fixed overhead costs 3/ 4/	.01828	
Total 5/	.10473	(.09887)

1/ Heavy hens, 13 lbs. RTC; heavy toms, 22 lbs. RTC; fryer-roasters, 7 lbs. RTC. These figures indicate what the costs are for a plant when it slaughters the different product classes. Annual output is 30 million lbs. live weight, which is representative of federally inspected plants. Costs are based upon a year-round operation of 50 percent of capacity and on a scale of operation of 2,000, 1,500, and 2,500 head per hour for hens, toms, and fryer-roasters, respectively. Increasing the weight per unit will decrease per pound costs.

2/ Wages inflated to reflect the increase in hourly earnings of production workers in poultry-dressing plants from an average of $1.38 in 1960 to $2.20 in March 1971. Increase in productivity is included.

3/ Costs inflated by the change in the index of prices of inputs purchased by food marketing firms--103 in 1960, 136 in 1970.

4/ Includes a 12-percent return on capital investment.

5/ Figure in parentheses represents total cost excluding the return on capital investment.

Adapted from G.B. Rogers and E.H. Rinear. Costs and Economies of Scale in Turkey Processing Plants. U.S. Dept. Agr., Mktg. Res. Rpt. 627, 1963.

Table 15—Federally inspected slaughter of turkeys, ratio of average monthly volume to volume of peak 2 months as a measure of use of plant capacity, 1965-72

Year	Certified ready-to-cook weight	Average monthly volume	Average volume of peak 2 months	Estimated percent use of capacity
	Mil. lbs.			Percent
Young turkeys (heavy):				
1965	1,195.0	99.6	254.8	39.1
1966	1,342.1	111.8	261.8	42.7
1967	1,528.4	127.4	269.0	47.4
1968	1,353.9	112.8	253.1	44.6
1969	1,344.4	112.0	240.5	46.6
1970	1,468.0	122.3	252.6	48.4
1971	1,536.2	128.0	241.0	53.1
1972	1,689.6	140.8	263.4	53.5
Fryer-roaster turkeys:				
1965	105.7	8.8	13.6	64.7
1966	108.3	9.0	11.4	78.9
1967	105.8	8.8	12.8	68.8
1968	79.0	6.6	8.7	75.9
1969	69.5	5.8	7.6	76.3
1970	82.2	6.9	9.4	73.4
1971	87.0	7.2	9.1	79.1
1972	90.4	7.5	9.3	80.6
All turkeys:				
1965	1,330.1	110.8	268.6	41.3
1966	1,477.9	123.2	273.4	45.1
1967	1,665.0	138.8	282.2	49.2
1968	1,455.5	121.3	261.4	46.4
1969	1,432.8	119.4	248.1	48.1
1970	1,566.5	130.5	260.9	50.0
1971	1,641.6	136.8	249.4	54.9
1972	1,796.5	149.7	272.0	55.0

Source: Based on data from Statis. Rptg. Serv., U.S. Dept. Agr.

Table 16--Source of waste treatment for plants slaughtering predominantly turkeys and plants slaughtering both turkeys and broilers, (with neither predominant), 1970

Product class	Number of plants	Source of waste treatment			
		Private	Municipal	Private and municipal	None
Turkey	106	32	57	12	1/
Mixed	31	15	11	4	1/
Total	137	47	68	16	6

1/ Not revealed to avoid disclosure of individual plant data.

Source: Unpublished USDA Consumer and Mktg. Serv. survey data.

Turkeys certified RTC from federally inspected plants accounted for 91 percent of total production in 1972. Of the approximately 1.8 billion pounds of RTC turkey processed in 1972, over 0.6 billion pounds (over 35 percent of all turkeys processed) were used in further processed items (table 17). The

Table 17--Turkeys processed, by end product, 1962-72

Year	Whole ready-to-cook			Cut-up 2/	Further processed 2/
	Chilled	Frozen	Total 1/		
	Million pounds				
1962	145	952	1,097	37	148
1963	156	1,008	1,164	49	191
1964	175	1,078	1,253	60	211
1965	280	1,050	1,330	97	253
1966	310	1,168	1,478	121	335
1967	305	1,360	1,665	115	318
1968	272	1,183	1,456	135	383
1969	303	1,130	1,433	160	494
1970	310	1,257	1,567	191	479
1971	328	1,314	1,642	198	562
1972	392	1,405	1,797	299	639

1/ Total certified, ready-to-cook weight.
2/ Cut-up birds and further processed products are not in addition to total whole RTC, but rather are derived from the stock of whole birds.

Source: Poultry Slaughtered Under Federal Inspection and Poultry Used in Further Processed Foods. U.S. Dept. Agr., Statis. Rptg. Serv., various issues.

bulk of this further processed turkey is made into roasts; 4- to 5-pound foil-wrapped packages of frozen raw meat (sold to consumers); 10- to 12-pound cooked rolls (going primarily to institutional markets); frozen turkey dinners and

pies (for consumers); and bulk meat and parts (some of which go to specialized outlets). Turkey roasts first appeared in significant volume in 1963, and since then, have been the fastest selling further processed consumer poultry product. By 1971, an estimated 55 percent of the further processed meat was used in rolls, roasts, breasts, and related products (7, 8). The percentage of turkeys used in further processed items is expected to increase in the 1970's, possibly accounting for up to 45 percent of all turkeys slaughtered by 1980. By using turkeys in further processed items and cutting the whole birds into parts, the industry is attempting to increase turkey consumption beyond the traditional Thanksgiving and Christmas seasons. In 1972, about 17 percent of the turkeys were cut-up, compared with only 3 percent in 1962.

Surplus and Deficit Areas

Turkey production is more widely dispersed through the United States than chicken-broiler production, yet more than half the States do not produce enough turkeys for their own consumption. Consumption for each State was estimated by multiplying the average U.S. per capita consumption of 9.1 pounds in 1972 by each State's 1972 population. This figure was compared with 1972 production to give the surplus or shortage position for each State (fig. 4).

The Eastern States are deficit in production, except for Virginia, West Virginia, North Carolina, and South Carolina. Until recently, all the Eastern States were deficit, and turkeys were shipped from as far away as California. In table 18, the surplus or deficit positions of the States and regions are shown for selected years beginning with 1950. The West North Central region has been a surplus area since 1950, and in 1972, had a surplus of 480 million pounds. The West South Central and the South Atlantic regions moved from deficits to surpluses.

Shipments of Turkeys

The data on surplus and deficit States indicate considerable shipment of turkeys to bring production to the consuming areas. Exact data on the origins, destinations, and quantities shipped are not available; however, a sample showing origin of receipts for 14 major cities is shown in table 19. The surplus Eastern States mainly supply the eastern seaboard. However, some shipments are sent from North Carolina to Chicago. Other eastern deficit States are supplied by the Central States. A small quantity of turkeys is shipped to New York from California.

Marketing Channels

Marketing channels for turkeys have changed in several respects since 1960. The volume handled by wholesale distributors has declined both absolutely and relatively. The percentage change in volume going directly from processors to retailers and institutions is shown in the following tabulation for selected years (1):

	Percent
1955	47.0
1960	57.8
1965	62.0
1970	72.0

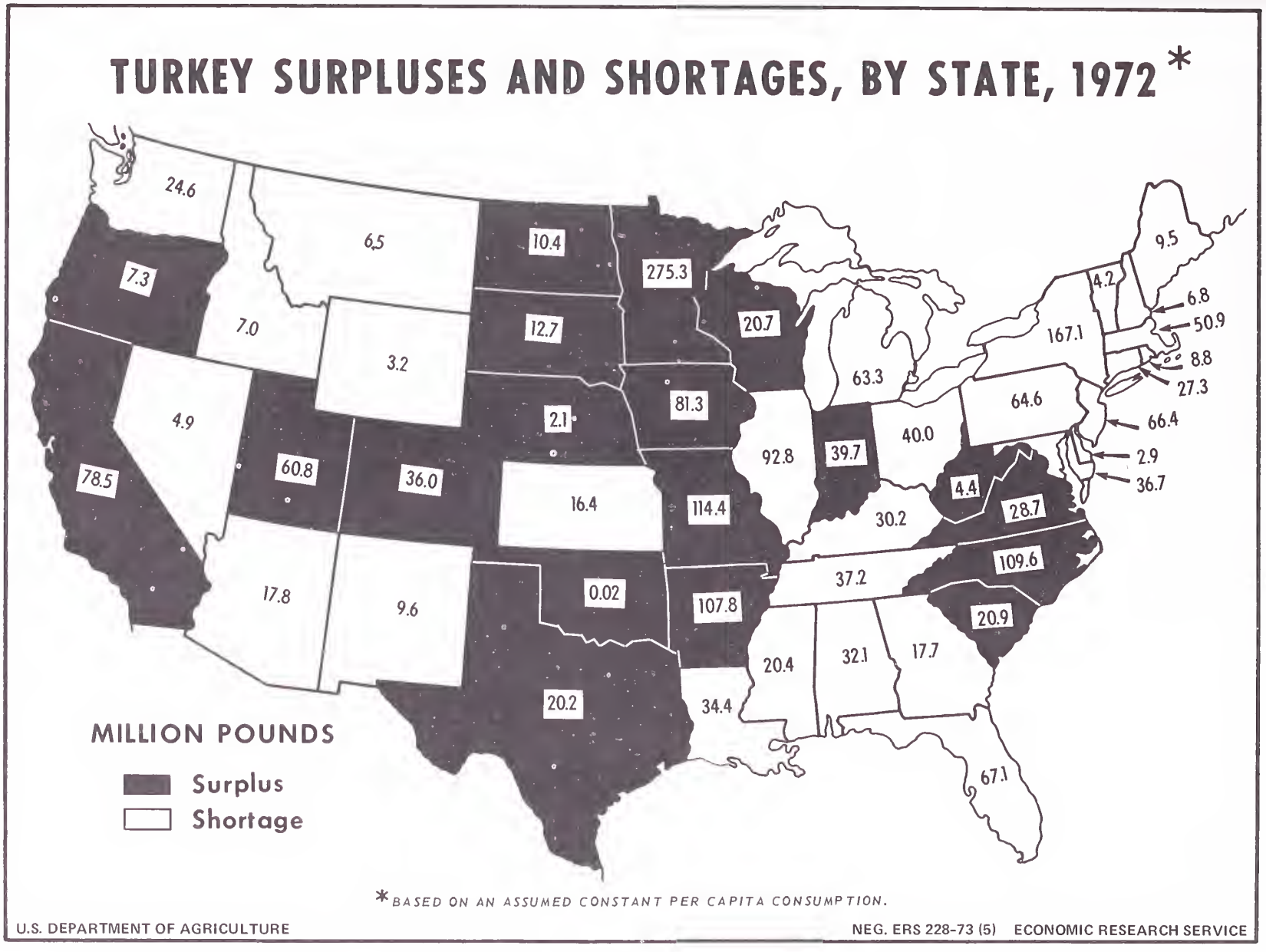

TURKEY SURPLUSES AND SHORTAGES, BY STATE, 1972*
24.6
7.3
6.5
7.0
3.2
10.4
12.7
275.3
20.7
9.5
4.2
6.8
50.9
167.1
8.8
27.3
63.3
64.6
66.4
4.9
2.1
81.3
92.8
39.7
40.0
2.9
36.7
78.5
60.8
36.0
16.4
114.4
4.4
28.7
30.2
109.6
37.2
17.8
9.6
0.02
107.8
20.9
20.4
32.1
17.7
20.2
34.4
67.1
MILLION POUNDS
Surplus
Shortage
*BASED ON AN ASSUMED CONSTANT PER CAPITA CONSUMPTION.
U.S. DEPARTMENT OF AGRICULTURE
NEG. ERS 228-73 (5) ECONOMIC RESEARCH SERVICE

Figure 4

Table 18--Turkey surpluses and shortages, by State and region, selected years 1/

State and region	1950	1960	1970	1971	1972
			1,000 pounds		
New England:					
Maine	-2,812	-5,066	-7,625	-8,727	-9,471
New Hampshire	-551	-2,315	-5,843	-6,242	-6,824
Vermont	78	-2,058	-3,506	-3,750	-4,173
Massachusetts	-13,860	-27,610	-44,016	-47,041	-50,887
Rhode Island	-2,610	-5,095	-7,771	-8,138	-8,771
Connecticut	-4,925	-12,704	-23,850	-25,416	-27,275
Total	-24,680	-54,848	-92,611	-99,314	-107,401
Mid-Atlantic:					
New York	-51,652	-96,326	-148,002	-155,676	-167,12[illegible]
New Jersey	-15,961	-36,323	-58,309	-61,768	-66,431
Pennsylvania	-19,764	-48,349	-63,243	-60,966	-64,567
Total	-87,377	-180,998	-269,554	-278,410	-298,122
East North Central:					
Ohio	-15,249	-20,789	-29,073	-30,386	-40,039
Indiana	917	16,377	31,217	21,653	39,718
Illinois	-24,176	-48,058	-79,312	-86,526	-92,765
Michigan	-14,663	-31,150	-57,703	-60,621	-63,286
Wisconsin	-310	23,500	16,258	12,308	20,681
Total	-53,481	-60,120	-118,613	-143,572	-135,691
West North Central:					
Minnesota	47,700	155,663	210,627	212,520	275,349
Iowa	33,731	91,574	74,089	79,528	81,339
Missouri	8,280	35,692	88,245	95,126	114,382
North Dakota	3,720	8,575	10,238	10,858	10,431
South Dakota	1,219	6,497	7,078	12,215	12,715
Nebraska	5,644	8,735	-1,761	964	2,148
Kansas	1,436	-1,131	-13,261	-15,036	-16,373
Total	101,530	305,605	375,255	396,175	479,991
South Atlantic:					
Delaware	296	303	-3,475	-2,822	-2,940
Maryland	-4,024	-17,426	-32,191	-34,065	-36,692
Washington, D.C.	2/	2/	-6,294	-6,549	-6,927
Virginia	10,760	13,982	23,146	23,974	28,732
West Virginia	2,733	-2,436	-6,644	2,028	4,374
North Carolina	-9,933	-2,331	98,449	97,492	109,612
South Carolina	1,515	-5,514	25,051	18,842	20,901
Georgia	-10,336	-18,636	-1,938	-8,336	-17,706
Florida	-10,078	-29,984	-55,026	-59,669	-67,051
Total	-22,457	-66,921	41,078	30,895	32,303

See footnotes at end of table.

Continued

Table 18--Turkey surpluses and shortages, by State and region, selected years--Con. 1/

State and region	1950	1960	1970	1971	1972
			1,000 pounds		
East South Central:					
Kentucky	-8,131	-13,898	-25,550	-27,952	-30,165
Tennessee	-11,470	-20,833	-32,706	-34,576	-37,171
Alabama	-10,623	-16,087	-28,552	-30,033	-32,148
Mississippi	-7,648	-11,715	-18,147	-19,138	-20,398
Total	-37,872	-62,533	-104,955	-111,699	-119,882
West South Central:					
Arkansas	-1,653	21,566	97,126	107,218	107,750
Louisiana	-10,327	-19,943	-30,411	-32,086	-34,419
Oklahoma	-2,393	4,240	4,706	5,283	19
Texas	6,109	-2,711	43,540	39,350	20,247
Total	-8,264	3,152	114,961	119,765	93,597
Mountain:					
Montana	-846	-4,205	-5,666	-6,015	-6,479
Idaho	1,080	-830	-4,995	-6,008	-6,961
Wyoming	63	-1,931	-2,770	-2,920	-3,157
Colorado	4,584	12,090	27,098	26,687	36,030
New Mexico	-2,011	-5,026	-8,399	-8,932	-9,623
Arizona	-1,901	-6,943	-13,977	-15,633	-17,765
Utah	23,043	39,138	59,252	62,443	60,799
Nevada	-315	-1,838	-4,121	-4,436	-4,881
Total	23,697	30,455	46,422	45,186	47,963
Pacific:					
Washington	2,984	-9,598	-20,122	-21,349	-24,574
Oregon	22,489	9,817	14,142	9,799	7,320
California	66,655	121,053	76,004	80,290	78,513
Total	92,128	121,272	70,024	68,740	61,259

1/ Minus figures indicate shortages.
2/ Washington, D.C., is included in the South Atlantic total.

Source: Unpublished data of Farmer Coop. Serv., U.S. Dept. Agr., 1950 and 1960. Computed by Mktg. Econ. Div., Econ. Res. Serv., U.S. Dept. Agr., 1970-72.

Table 19--Origin of receipts of turkeys, sample of 14 cities, 1972

City	Principal origin 1/
Boston	The Central States, Virginia, North Carolina, and Georgia
New York	The Central States, North Carolina, Georgia, Virginia, and California
Baltimore	The Central States, Virginia, North Carolina, and Georgia
Washington, D.C.	Virginia, North Carolina, and Georgia
Cleveland	Ohio, North Carolina, Georgia, and the Central States
Chicago	The Central States, North Carolina, and Georgia
Minneapolis-St. Paul	The Central States
St. Louis	The Central States
Atlanta	The Central States, Virginia, North Carolina, and Georgia
Denver	The Central States, California, North Carolina, and Georgia
Houston	The Central States and California
Los Angeles	California and the Central States
San Francisco	California
Seattle	California and the Central States

1/ The origins of receipts to these major cities are listed in order of importance.

Source: Poultry Market News Branch, Poultry Div., Consumer and Mktg. Serv., U.S. Dept. Agr., Market News Field Offices.

The increased bypassing of wholesale distributors has occurred with both ready-to-cook birds and further processed products. The major marketing channels for turkeys are shown in detail for 1969 in figure 5.

Further processed products accounted for over 35 percent of the volume of turkeys slaughtered in 1972, compared with about 10 percent a decade ago. In absolute terms, total use of turkeys in ready-to-cook form (whole birds and parts) remained relatively constant, but use in further processed form increased 400 percent. While sales of ready-to-cook turkeys through retail outlets remained steady and sales of further processed products increased severalfold, sales of ready-to-cook turkeys still exceeded sales of further processed products by more than a 3-to-1 ratio. Institutional users of turkeys had extensively substituted further processed products for ready-to-cook birds. As a result, further processed product usage exceeded ready-to-cook product usage by about a 3-to-1 margin in institutions.

The percentage of total supply accounted for by storage stocks varies from year to year, depending on output and price considerations. On the whole, it has not changed much during the 1960's. In recent years, exports of whole turkeys and parts have accounted for a smaller percentage of supply than a few years ago, but about the same percentage as in 1960-61. Turkey rolls and roasts are not included in these export figures but have become increasingly important export items. They are not separately identified in the export statistics, and thus their precise addition to the total export of turkeys is not known. Imports of turkeys have always been negligible.

Other factors affecting supply are: (1) amount used by the military, which has followed a similar pattern to general use, (2) proportion of turkey slaughtered in federally inspected plants, which has increased steadily during the 1960's, and (3) consumption of turkeys on farms, which is negligible and has not even been separately reported since the 1960's.

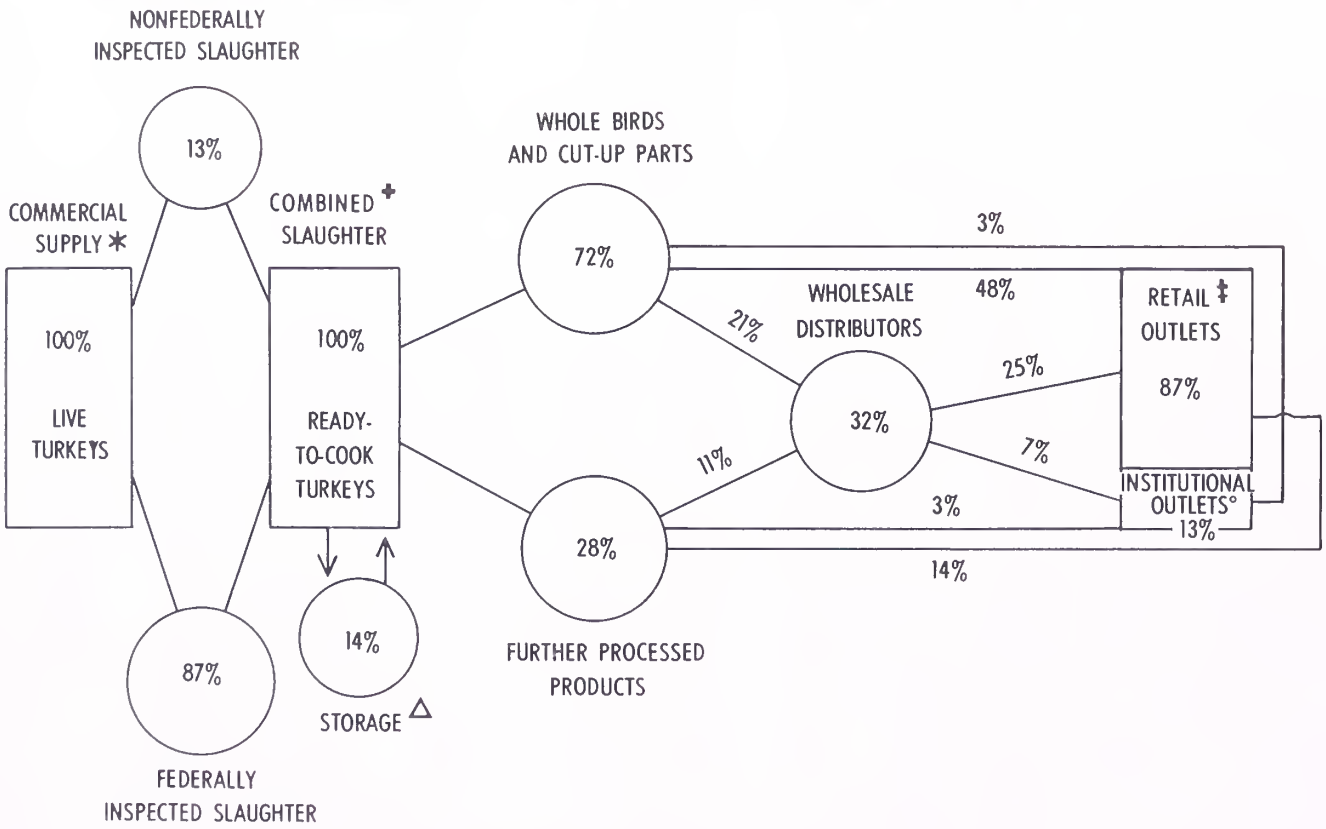
Prices and Price Spreads

Prices consumers pay for turkeys are much higher than the cost of production and include charges for such services as processing, transportation, packaging, and storage. Prices and price spreads for medium and large turkeys are given in table 20. Data are more complete for the medium-size turkeys, and these margins are shown as a percentage of retail price in figure 6. The percentage shares remained relatively stable, except for a decrease in the farmers' share in 1967 and again in 1970 and 1971. In 1967, the farm-to-retail share increased as a percentage of retail price, but in 1970 the retail-to-consumer share increased. The procedure for collecting retail prices does not reflect lower special prices for the holidays. Thus, the retail price is probably overstated for the year.

Consumption and Demand

Per capita turkey consumption increased from 4.1 pounds in 1950 to a record high of 9.1 pounds in 1972, but there were yearly fluctuations. Also of importance is the highly seasonal consumption of turkeys. For 1972, about 72 percent of consumption was in the last half of the year, and about 46 percent

MAJOR MARKETING CHANNELS FOR TURKEY, 1969



* INCLUDES NEGLIGIBLE AMOUNTS CONSUMED ON FARMS AND IMPORTED. DOES NOT INCLUDE 2% EXPORTS.
\+ 80% CONVERSION FACTOR FROM LIVE WEIGHT TO READY-TO-COOK FORM.
△ CIRCULAR FLOW -- TURNED OVER EACH YEAR.
‡ INCLUDES STORES AND RETAIL WAREHOUSES.
○ INCLUDE RESTAURANTS, SCHOOLS, MILITARY, AND OTHER MASS FEEDING INSTITUTIONS.

U.S. DEPARTMENT OF AGRICULTURE NEG. ERS 229-73 (5) ECONOMIC RESEARCH SERVICE

Figure 5

Table 20--Prices and price spreads for ready-to-cook turkeys in 12 cities, 3-month average (Oct.-Dec.), 1965-72 1/

Items	1965	1966	1967	1968	1969	1970	1971	1972
					Cents			
Medium turkeys:								
Farm value	29.3	30.7	24.0	28.2	31.5	29.9	30.0	30.2
Price to retailers	39.6	42.2	37.3	38.9	44.2	42.6	42.6	42.6
Retail price	49.1	50.7	46.4	48.0	52.7	55.3	55.6	55.9
Spreads:								
Farm retail	19.8	20.0	23.2	19.8	21.2	25.4	25.6	25.7
Farm retailer	10.3	11.5	14.1	10.7	12.7	12.6	12.6	12.4
Retail consumer	9.5	8.5	9.1	9.1	8.5	12.6	13.0	13.3
					Percent			
Percentage of retail price:								
Farm share	59.7	60.6	51.4	58.8	59.8	54.1	54.0	54.0
Farm retail share	21.0	22.7	28.7	22.3	24.1	23.0	22.7	22.2
Retailer-consumer	19.3	16.7	19.6	18.9	16.1	22.9	23.3	23.8
					Cents			
Large turkeys:								
Farm value	24.8	29.0	20.7	24.9	26.3	55.0	28.0	3/27.9
Price to retailers	36.9	40.8	34.7	36.9	40.1	2/39.1	38.6	41.1
Retail price	NA	NA	44.1	2/45.1	48.8	51.1	51.1	51.4
Spreads:								
Farm retail	NA	19.5	23.4	NA	20.9	25.7	23.0	23.8
Farm retailer	12.1	11.8	14.0	12.0	12.3	2/13.6	10.6	10.2
Retail consumer	NA	7.7	9.4	NA	8.7	2/11.9	12.4	10.3
					Percent			
Farm share of retail price:	NA	59.8	46.9	NA	57.1	49.7	54.9	54.3

NA = not available.

1/ The 12 cities are Boston, New York, Baltimore, Washington, D.C., Atlanta, Cleveland, Chicago, St. Louis, Denver, Los Angeles, San Francisco, and Seattle.

2/ 5-city average--Boston, New York, Chicago, St. Louis, and Los Angeles.

3/ 11-city average--New York, Baltimore, Washington, D.C., Atlanta, Cleveland, Chicago, Denver, Los Angeles, San Francisco, Seattle, and Houston.

Source: U.S. Dept. Agr., Econ. Res. Serv., Mktg. Econ. Div.

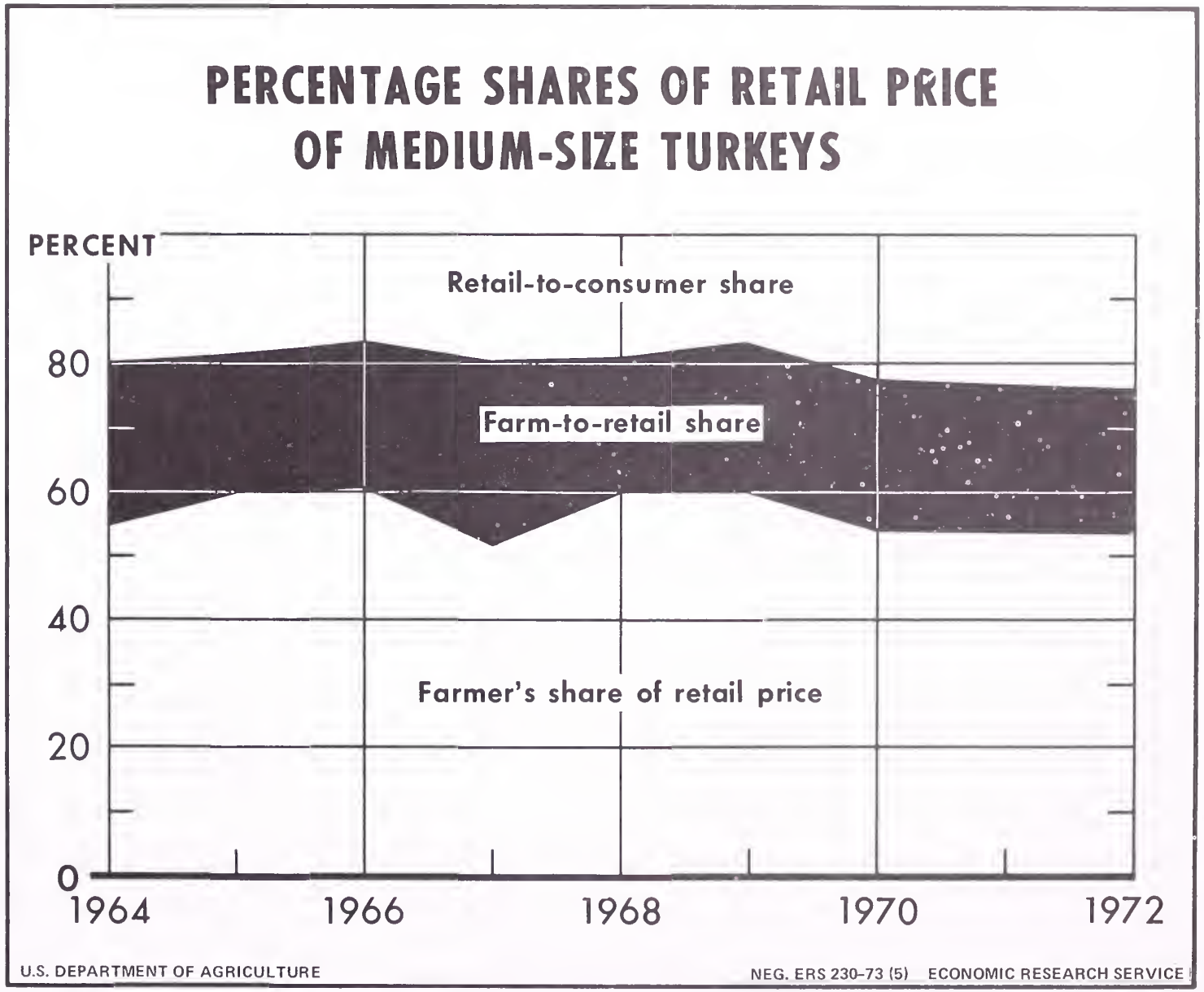

PERCENTAGE SHARES OF RETAIL PRICE
OF MEDIUM-SIZE TURKEYS
PERCENT
80
60
40
20
0
1964
1966
1968
1970
1972
Retail-to-consumer share
Farm-to-retail share
Farmer's share of retail price
U.S. DEPARTMENT OF AGRICULTURE
NEG. ERS 230-73 (5) ECONOMIC RESEARCH SERVICE

Figure 6

in the last quarter (table 21). This seasonal consumption points up the high preference for turkey at Thanksgiving and Christmas and the low preference the rest of the year.

The turkey industry has made several attempts, ranging from promotion to developing new products, to alter this seasonal consumption pattern. The

Table 21--Per capita consumption of turkeys, quarterly, 1960-72

Year	First	Second	Third	Fourth	Annual
			Pounds		
1960	0.6	0.8	1.3	3.4	6.1
1961	0.6	1.0	1.7	4.1	7.4
1962	0.7	0.9	1.5	3.9	7.0
1963	0.5	0.9	1.5	3.9	6.8
1964	0.7	0.9	1.8	4.0	7.4
1965	0.7	0.8	1.8	4.1	7.4
1966	0.7	1.0	2.0	4.1	7.8
1967	0.8	1.1	2.2	4.5	8.6
1968	1.0	1.1	1.9	4.0	8.0
1969	0.9	1.2	2.0	4.2	8.3
1970	0.9	0.9	2.2	4.2	8.2
1971	1.0	1.2	2.1	4.2	8.5
1972	1.1	1.3	2.2	4.5	9.1

Source: Poultry and Egg Situation, U.S. Dept. Agr., Econ. Res. Serv., various issues.

development of new ways of using turkey and of new further processed products, such as rolls, roasts, ground turkey, pot pies, and frozen dinners, may be having some impact on the consumption pattern. From 1963 to 1972, consumption in the last two quarters of the year decreased from 79.4 to 71.9 percent of total consumption, and for the last quarter, from 57.4 to 46.1 percent of total consumption.

The farm price of turkeys decreased from 32.9 cents per pound in 1950 to 22.2 cents in 1972, while per capita consumption increased. During this same period, per capita consumption of two competing meats--beef and chicken (broilers)--increased. Per capita pork consumption remained about the same.

Although the farm price of turkeys fluctuated in relation to the farm price for competing meats during 1950-72, generally, turkey prices decreased from above beef and pork prices and held about the same relationship to broiler prices. Since 1966, the farm price of turkeys has been below that for beef, with the gap continuing to widen. Turkey prices were below pork prices in 1966 and 1969 but rose above pork prices in 1970 and 1972. (Statistical analyses of prices and incomes may be found in other studies (13, 14)).

The relationship between the retail price of turkeys, deflated by the consumer price index, and per capita consumption is shown in figure 7. As price decreased, turkey consumption increased. For several reasons, it is not possible to define this relationship as a single demand curve. The cost of production, which decreased over time, probably caused a shift of the supply curve to the right. Demand, likewise, could have shifted to the right, and the points could be the intersection of a number of supply and demand curves. Also, further processed products increased their share of per capita consumption, thus indicating per capita consumption may not represent the same demand as in earlier years. Another study has indicated the demand for turkeys at the farm level has not shifted (14).

The same study contains the quarterly price elasticities of demand for turkeys. Price elasticity is defined as the percentage change in quantity with a 1-percent increase in price. The calculated aggregate price elasticities in the study were -.46 for the first quarter, -1.01 for the second, -1.10 for the third, and -.47 for the fourth.

Seasonality of Supply

The supply of turkeys is also highly seasonal, although production and processing are being spread more throughout the year. Traditionally, turkeys have been grown during the summer and processed during the late summer and early fall. Based on slaughter reports for 1972, October was the peak month for slaughter, followed by November and August. About 39 percent of the slaughter was in the last quarter, which means fourth-quarter processing was less than consumption.

Cold-storage holdings and the beginning and ending stocks, as well as current processing, influence per capita supplies. Currently, about 80 percent of the turkeys are frozen and may be stored for consumption in a later period. The beginning monthly stocks are shown for selected years in table 22. Since 1965, cold-storage holdings have been lowest in either June or July and highest on the first of November; they have decreased on an average of 123 million pounds from November to December, and 75.3 million pounds from December to January.

Cold-storage holdings for November 1 reached a high of 550.8 million pounds in 1967, following record production in 1966 and 1967. Although production was down in 1968 and 1969, the high carryover into 1968 kept cold-storage holdings at high levels through 1969.

Consumption Projections

Per capita consumption of turkeys is projected to be about 10.5 pounds in 1980 (2), up from the 1972 level of 9.1. This figure would represent a total consumption of 2.4 billion pounds, or an increase of 26 percent from 1972 RTC output. Consumption of cut-up and further processed items has increased more rapidly than consumption of whole turkeys, and much of the increase in per capita consumption may be in further processed products. In 1972, about 35 percent of total certified, ready-to-cook turkey was used in further processing, and this amount may increase to more than 45 percent by 1980 (6, 7). Soy

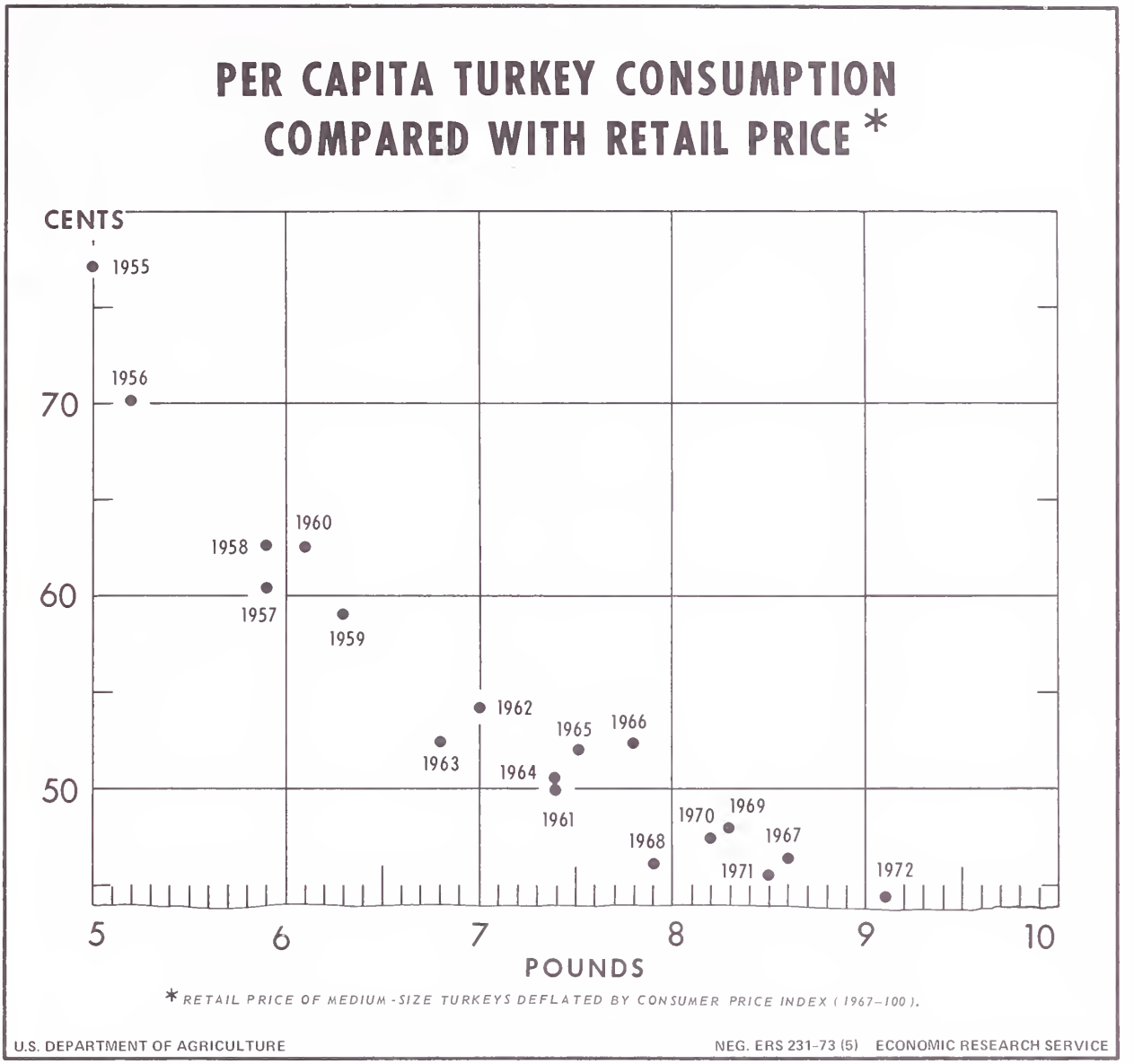

PER CAPITA TURKEY CONSUMPTION
COMPARED WITH RETAIL PRICE *
CENTS
70
60
50
1955
1956
1958
1957
1960
1959
1962
1963
1965
1966
1964
1961
1968
1970
1969
1967
1971
1972
5
6
7
8
9
10
POUNDS
* RETAIL PRICE OF MEDIUM-SIZE TURKEYS DEFLATED BY CONSUMER PRICE INDEX (1967–100).
U.S. DEPARTMENT OF AGRICULTURE
NEG. ERS 231-73 (5) ECONOMIC RESEARCH SERVICE

Figure 7

Table 22--Cold-storage holdings of turkeys, 1st of the month, 1955, 1960, and 1965-72

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	Million pounds											
1955	121.0	124.0	110.7	92.5	70.7	60.2	51.5	45.0	48.0	76.9	144.3	129.0
1960	149.2	142.3	124.0	105.2	87.3	74.3	66.7	70.9	112.5	186.1	282.2	209.9
1965	207.4	197.1	168.9	137.0	105.7	82.5	70.0	88.4	147.2	243.6	362.8	280.3
1966	200.1	182.4	156.5	122.0	92.3	69.4	69.7	103.6	171.4	282.5	395.5	312.1
1967	267.1	272.1	253.9	206.6	176.1	149.4	159.9	221.3	332.1	441.5	550.8	428.7
1968	366.9	360.6	310.3	267.8	225.1	194.1	185.3	226.0	304.7	385.9	504.4	385.7
1969	317.1	293.6	254.4	201.4	155.0	123.0	119.3	162.7	237.1	329.4	435.6	283.8
1970	191.9	162.1	132.7	101.1	81.5	73.7	94.7	155.5	237.9	343.0	450.5	313.1
1971	218.9	207.1	177.3	146.0	119.4	111.5	140.3	202.8	307.6	389.0	475.2	308.7
1972	223.1	211.3	180.5	145.9	120.8	110.8	142.3	214.1	313.0	407.5	475.7	297.0

Source: Poultry and Egg Situation, U.S. Dept. Agr., Econ. Res. Serv., various issues.

proteins have been developed for substitutes in processed meat items and will probably be used to some extent during the 1970's. One estimate is that 1.7 to as much as 3.5 percent of projected 1980 turkey consumption could be replaced by vegetable protein (6).

Turkey is a good source of protein, having a slightly higher percentage than regular hamburger. Also, it has only about 15 percent fat, compared with 21 percent in hamburger. If the technology of boning and processing turkey meat is sufficiently improved, turkey may be able to hold its own against substitutes penetrating the market for processed items and may even substitute for beef in some processed products. The dark meat from turkey is being ground and used in patties and other products with considerable success in California, Michigan, Illinois, and many other areas of the United States.

Condemnations and Yields

Turkeys are inspected twice in processing plants by Government inspectors. Inspection of live birds is known as ante-mortem inspection and examination of carcass and body contents after slaughter as post-mortem inspection. Yield is the pounds certified ready-to-cook as a percentage of total pounds inspected, and the loss includes ante- and post-mortem condemnations as well as the dressing loss of the feathers and offal (table 23).

From 1960 to 1963, the ante-mortem condemnations decreased, but they increased in 1964, and since 1969 have been over 0.20 percent. The post-mortem condemnations trended upward from 1.25 percent in 1960 to a high of 2.80 percent in 1970, but decreased slightly in 1972 to 2.60 percent. The yield of ready-to-cook turkeys declined slightly from 1960 to 1972, reflecting, for the most part, the increase in post-mortem condemnations.

Causes of post-mortem condemnations in turkeys are primarily diseases and infections, the major ones being septicemia and cirsaculitis. Contamination of the meat also accounts for a number of condemnations.

Table 23--Condemnations and yields of turkeys as a percentage of turkeys slaughtered under Federal inspection, 1960-72

Year	Condemnations		Yield 1/
	Ante-mortem	Post-mortem	
	Percent of slaughter		
1960	0.147	1.25	79.70
1961	.136	1.56	79.45
1962	.136	1.53	79.53
1963	.124	1.51	79.73
1964	.138	1.60	79.70
1965	.145	1.73	79.70
1966	.165	2.09	79.46
1967	.199	2.17	79.44
1968	.193	2.17	79.46
1969	.211	2.47	79.28
1970	.220	2.80	78.80
1971	.214	2.77	78.69
1972	.229	2.60	78.84

1/ Total pounds of certified, ready-to-cook weight as a percentage of live weight inspected.

Source: Compiled from unpublished data of U.S. Dept. Agr., Consumer and Mktg. Serv., Poultry Div.

LITERATURE CITED

(1) Blase, Kenneth E., and Rogers, George B.
1972. Market Structure of the Food Industries, Poultry and Eggs, pp. 37-50, U.S. Dept. Agr., Mktg. Res. Rpt. 971, Sept.

(2) Culver, D.W., and Chai, J.C.
1970. A View of Food and Agriculture in 1980. Agr. Econ. Res. Volume 22, No. 3, July.

(3) Gallimore, William W.
1965. Contracting and Other Integrating Arrangements in the Turkey Industry. U.S. Dept. Agr., Mktg. Res. Rpt. 734, Nov.

(4) _____ and Vertrees, J.G.
1968. A Comparison of Returns to Poultry Growers--Under Contract--Operating Independently. U.S. Dept. Agr., Mktg. Res. Rpt. 814, Feb.

(5) _____
1969. Regional Differences in Growth of the United States Turkey Industry. N.C. State Univ., Raleigh, Ph.D. thesis (unpublished).

(6) _____
1972. Synthetics and Substitutes for Agricultural Products. U.S. Dept. Agr., Mktg. Res. Rpt. 947, Mar.

(7) Jones, Harold B., Jr.
1972. The Market Potential for Further Processed Poultry Products. Univ. of Ga., Athens, Agr. Expt. Sta., Res. Bul. 118, Nov.

(8) _____ and Rogers, George B.
1973. Turkey Rolls and Roasts: Costs, Prices and Consumption. Univ. of Ga., Athens, Agr. Expt. Sta., Res. Bul., in press.

(9) Mighell, Ronald L., and Hoofnagle, William S.
1972. Contract Production and Vertical Integration in Farming, 1960 and 1970. U.S. Dept. Agr., Econ. Res. Serv., No. 479, Apr.

(10) Pederson, John R.
1965. Economies of Scale in Turkey Hatcheries. U.S. Dept. Agr., Mktg. Res. Rpt. 719, July.

(11) Rhodes, V. James.
1970. Changes in Turkey Contracting, 1967-68. Univ. of Mo., Columbia, Agr. Expt. Sta., Tech. Bul. 886, Mar.

(12) Rogers, George B.
1963. Costs and Economies of Scale in Turkey Processing Plants. U.S. Dept. Agr., Mktg. Res. Rpt. 627, Sept.

(13) Soliman, M.A.
1970. Quarterly Econometric Model of the Turkey Industry in the United States. Univ. of Minn., Minneapolis, Agr. Expt. Sta., Tech. Bul. 275.

(14) _____
1971. Statistical Analysis of Cyclical Variations in the National Turkey Market. Univ. of Minn., Minneapolis, Agr. Expt. Sta., Tech. Bul. 276.

(15) _____ and Burbee, C.R.
1971. Economic Analysis of United States Turkey Prices and Producer Income. Univ. of Minn., Minneapolis, Agr. Expt. Sta., Tech. Bul. 281.

(16) Vertrees, James G.
1972. The Poultry Processing Industry--A Study of the Impact of Water Pollution Control Costs. U.S. Dept. Agr., Mktg. Res. Rpt. 965, June.

(17) _____ and Larzelere, Henry E.
1972. Factors Affecting Shell Egg Distribution Channel Costs. Mich. State Univ., East Lansing, Agr. Econ. Rpt. 214, Mar.

Appendix table 1--Supply and utilization of turkey, 1950-72 1/

Year	Supply: Production 2/	Supply: Imports and inshipments	Supply: Beginning stocks 3/: Commercial	Supply: Beginning stocks 3/: USDA	Supply: Beginning stocks 3/: Total	Supply: Total supply	Utilization: Ending stocks 3/	Utilization: Exports and shipments 4/: Commercial	Utilization: Exports and shipments 4/: USDA	Utilization: Exports and shipments 4/: Total	Utilization: Domestic disappearance: Military 5/	Utilization: Domestic disappearance: Civilian: Total	Utilization: Domestic disappearance: Civilian: Per capita ready-to-cook 6/
	Million pounds												Pounds
1950	615	--	118	9	127	742	110	--	--	--	20	612	4.1
1951	703	--	110	--	110	813	107	--	--	--	35	671	4.4
1952	795	--	107	--	107	902	147	--	--	--	41	714	4.7
1953	758	--	147	--	147	905	122	--	--	--	42	741	4.8
1954	871	--	122	--	122	993	121	--	--	--	30	842	5.3
1955	818	--	121	--	121	939	95	--	--	--	26	818	5.0
1956	957	--	95	--	95	1,052	162	--	--	--	30	860	5.2
1957	1,034	--	162	--	162	1,196	177	--	--	--	29	990	5.9
1958	1,038	--	177	--	177	1,215	162	5	1	6	32	1,015	5.9
1959	1,123	--	162	--	162	1,285	149	12	--	12	32	1,092	6.3
1960	1,156	--	149	--	149	1,305	160	24	--	24	31	1,090	6.1
1961	1,506	--	160	--	160	1,666	263	28	--	28	29	1,346	7.4
1962	1,302	--	263	--	263	1,565	203	37	--	37	34	1,291	7.0
1963	1,355	--	203	--	203	1,558	217	31	--	31	40	1,270	6.8
1964	1,459	--	217	--	217	1,676	207	43	--	43	36	1,390	7.3
1965	1,521	--	207	--	207	1,728	200	58	--	58	40	1,430	7.4
1966	1,685	--	200	--	200	1,885	267	47	--	47	56	1,515	7.8
1967	1,883	--	267	--	267	2,150	367	49	--	49	53	1,681	8.6
1968	1,620	--	367	--	367	1,987	317	41	--	41	63	1,566	8.0
1969	1,614	--	317	--	317	1,931	192	37	--	37	48	1,654	8.3
1970	1,757	--	192	--	192	1,930	219	35	--	35	49	1,646	8.2
1971	1,809	--	219	--	219	2,028	223	23	--	23	42	1,740	8.5
1972 7/	1,935	--	223	--	--	2,158	212	25	--	25	40	1,843	9.1

--means none reported.

1/ Certified, ready-to-cook weight. 2/ Includes turkey sold from and consumed on farms where produced. The factor for converting from live weight to ready-to-cook weight was increased gradually from 75 percent in 1950-55 to 80 percent in 1961. 3/ Stock data in terms of product weight as reported. 4/ Exports prior to 1958 were negligible, and data were not reported separately for chicken. 5/ Includes USDA donations to military and military feeding of civilians in occupied territories. 6/ Includes giblets. 7/ Preliminary.

Sources: Selected Statis. Series for Poultry and Eggs Through 1968, No. 232, U.S. Dept. Agr., Econ. Res. Serv., Jan. 1970, and Poultry and Egg Situation, U.S. Dept. Agr., Econ. Res. Serv., various issues.

Appendix table 2--U.S. exports of turkey, to selected areas and total, by month, 1962, 1965-72

Area and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	1,000 pounds												
Common Market:													
West Germany:													
1962	1,766	1,621	1,541	840	2,839	1,954	1,085	330	3,606	5,009	3,392	1,134	25,117
1965	644	1,526	2,587	1,835	948	1,812	1,738	3,955	6,310	7,919	5,276	2,915	37,464
1966	2,470	1,879	803	384	340	584	1,205	3,209	4,916	6,895	6,071	2,039	30,795
1967	1,615	1,297	1,318	1,662	2,016	1,006	1,158	3,421	4,530	4,806	4,806	2,242	29,877
1968	2,119	3,080	1,649	1,907	919	754	903	1,571	2,551	3,231	3,900	2,363	24,947
1969	428	1,691	2,287	1,704	1,456	1,018	1,095	2,042	2,451	2,772	1,971	2,007	20,922
1970	2,191	1,531	1,239	1,279	1,028	1,098	1,333	2,208	2,637	3,148	2,320	1,237	21,260
1971	620	1,733	1,101	871	347	375	786	1,056	1,943	1,489	1,107	1,225	12,652
1972	1,152	1,346	792	815	411	653	1,339	2,056	1,424	1,783	2,490	1,624	15,887
Total Common Market:													
1962	1,852	1,927	1,712	937	2,905	2,114	1,232	894	4,279	5,676	3,904	1,471	28,903
1965	1,044	1,980	3,316	2,495	1,873	2,571	2,705	5,491	8,289	9,820	6,517	3,733	49,833
1966	3,311	2,529	1,404	786	934	1,486	1,504	4,073	5,251	7,875	6,788	2,423	38,364
1967	2,168	1,856	1,535	2,273	2,544	1,009	1,843	4,207	5,347	5,877	6,012	3,314	37,985
1968	2,571	3,682	1,803	2,028	1,119	953	1,268	1,988	2,903	3,816	4,761	2,882	29,774
1969	599	2,020	3,122	1,891	1,700	1,174	1,359	2,686	3,435	3,756	2,290	2,408	26,440
1970	2,391	1,552	1,533	1,412	1,070	1,216	1,498	2,558	3,418	4,650	2,562	1,652	25,513
1971	672	1,784	1,261	1,049	543	665	871	1,353	2,580	1,651	1,531	1,470	15,428
1972	1,352	1,608	908	957	573	989	1,573	2,469	1,739	2,831	3,507	1,868	20,373
Other countries:													
1962	257	310	384	298	501	960	740	1,000	1,226	707	903	664	7,950
1965	238	220	412	428	537	409	609	595	1,235	1,499	1,388	1,100	8,666
1966	487	447	366	397	478	305	296	832	970	1,767	1,394	847	8,586
1967	375	477	361	416	568	677	744	869	1,331	1,775	2,075	1,230	10,898
1968	779	1,042	539	677	482	435	891	1,356	1,880	883	1,642	1,250	11,856
1969	580	422	1,011	684	704	596	607	843	1,237	1,430	958	1,085	10,157
1970	349	518	303	553	320	591	379	967	1,268	1,718	1,412	1,084	9,461
1971	253	491	383	379	251	404	658	633	1,319	706	963	1,218	7,661
1972	323	650	679	640	532	661	1,338	1,461	1,429	2,523	2,810	2,969	16,017

Continued

Appendix table 2--U.S. exports of turkey, to selected areas and total, by month, 1962, 1965-72--Continued

Area and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	1,000 pounds												
Total exports:													
1962	2,108	2,237	2,096	1,234	3,406	3,074	1,972	1,894	5,505	6,383	4,807	2,135	36,853
1965	1,282	2,200	3,728	2,923	2,410	2,980	3,314	6,086	9,524	11,319	7,900	4,833	58,499
1966	3,798	2,976	1,770	1,183	1,412	1,791	1,800	4,905	6,221	9,642	8,182	3,270	46,950
1967	2,543	2,333	1,896	2,689	3,112	2,539	2,587	5,076	6,678	7,652	8,087	3,691	48,883
1968	3,350	4,724	2,342	2,705	1,601	1,388	2,160	3,344	4,783	4,699	6,403	4,132	41,631
1969	1,179	2,442	4,133	2,575	2,404	1,770	1,966	3,529	4,672	5,186	3,248	3,493	36,597
1970	2,740	2,070	1,836	1,965	1,390	1,807	1,877	3,525	4,686	6,368	3,974	2,736	34,961
1971	925	2,275	1,644	1,428	794	1,068	1,529	1,986	3,899	2,367	2,494	2,688	23,090
1972	1,675	2,258	1,587	1,597	1,105	1,650	2,911	3,930	3,168	5,354	6,317	4,837	36,390

Source: Poultry and Egg Situation, U.S. Dept. Agr., Econ. Res. Serv., various issues.

Appendix table 3—USDA contracts to purchase turkeys, by month, 1960-72 1/

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
						1,000 pounds, ready-to-cook weight							
1960.....	0	0	0	0	0	0	0	0	15,480	3,370	0	0	18,850
1961.....	0	0	0	0	0	0	0	7,810	40,205	11,935	140	0	60,090
1962.....	0	0	0	0	0	0	0	0	10,285	23,815	8,800	0	42,900
1963.....	0	0	0	0	0	0	0	1,485	30,910	11,165	0	0	43,560
1964.....	0	0	0	0	0	0	0	12,760	31,405	16,610	0	0	60,775
1965.....	0	0	0	0	0	0	0	0	13,272	15,232	1,400	0	29,736
1966.....	0	0	0	0	0	0	0	8,010	4,920	0	0	0	12,930
1967.....	0	0	0	0	0	0	11,760	17,190	26,490	19,440	0	0	74,790
1968.....	0	0	0	0	0	0	0	30,870	13,740	0	0	0	44,610
1969.....	0	0	0	0	0	0	0	5,855	12,110	2,625	0	0	20,590
1970.....	0	0	0	0	0	0	0	10,850	13,650	8,400	2,100	0	35,000
1971.....	0	0	0	0	0	0	8,190	6,790	10,360	12,670	7,140	0	45,150
1972.....	0	0	0	0	0	0	1,470	14,770	14,000	11,550	8,470	1,330	51,590
						Canned boned turkey, 1,000 dozen cans							
1968.....	0	0	0	0	0	0	0	0	0	3.4	299.2	533.8	918.0
1969.....	81.6	0	0	0	0	0	193.8	533.8	734.4	523.6	0	0	2067.2
1970.....	0	0	0	0	0	0	20.4	23.8	0	78.2	306.0	44.2	472.8
1971.....	85.0	40.8	23.8	0	0	0	149.6	207.4	0	0	0	0	486.2
1972.....	0	0	0	0	0	0	397.8	108.8	190.4	153.0	129.2	74.8	1054.0

1/ Not adjusted for contract cancellations.

Source: Poultry and Egg Situation, U.S. Dept. Agr., Econ. Res. Serv., various issues.

☆ U. S. GOVERNMENT PRINTING OFFICE : 1973 O - 511-983 (ERS-142)

Appendix table 4--Turkey slaughter, August through December, as a percentage of annual total turkey slaughter, by region, 1960-72

Year	North Atlantic	East North Central	West North Central	South Atlantic	South Central	West	United States
	Percent of slaughter						
1960	77.3	81.9	82.0	72.8	84.9	76.8	80.0
1961	78.5	79.1	79.6	67.9	80.3	71.9	76.4
1962	82.6	81.9	85.1	72.4	86.2	74.1	80.3
1963	85.3	81.8	84.4	74.4	87.1	75.5	80.8
1964	79.0	86.4	84.0	71.7	83.1	74.4	80.2
1965	78.8	86.1	83.9	72.8	85.2	76.2	81.1
1966	82.9	83.1	81.4	67.2	79.4	76.5	78.3
1967	73.2	82.8	78.6	63.0	73.4	71.7	74.5
1968	74.0	83.5	80.3	62.1	69.3	77.6	75.4
1969	71.7	84.1	77.9	64.0	67.4	74.0	73.6
1970	71.1	79.0	75.7	66.2	63.2	72.9	71.9
1971	72.2	77.2	70.3	56.7	49.1	68.0	64.6
1972	67.0	75.5	69.4	58.6	59.7	67.2	71.2

Source: Poultry Slaughtered Under Federal Inspection and Poultry Used in Further Processing, U.S. Dept. Agr., Statis. Rptg. Serv., various issues.

UNITED STATES DEPARTMENT OF AGRICULTURE
WASHINGTON, D.C. 20250

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF
AGRICULTURE
AGR 101
FIRST CLASS

U.S.MAIL